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THE elimination of grade crossings in New York is making some progress in spite of the veto of this year's appropriation by Governor Dix, a number of changes being provided for, so far as the state's proportion of the expense is concerned, by the Good Roads fund. For the improvement of highways, the state has made very liberal appropriations, and where a change of grade is desired in a state highway, and the Public Service Commission approves the plan, the work can go on without delay. The Public Service commission of the Second district has already approved changes at a number of places on state highways. The governor's veto really set back this important and necessary work very materially. The legislature appropriated \$700,000 for this year, half of which was to be used in New York City and the other half in other parts of the state. The governor's only reason for his veto was that large balances were already available; but he seems to have been oblivious to the fact that each crossing improvement requires a very long time from the beginning of the preliminary studies to the actual completion of the work. The Public Service Commission of the Second district, with a balance available of \$1,209,513, has already used or prepared to use \$1,176,132 of this sum, so that it can take no further action (except where the Good Roads fund is available), although there are 27 applications pending before it. The state of New York has made quite brave progress in the grade-crossing reform for a year or two past; but there is still need of a strong and consistent policy. She continues far behind Massachusetts. Frugality with public money is often a valuable virtue in a governor; but New York has suffered a good deal from governors whose notions of economy are shaped largely by the exigencies of an annual budget which had to be trimmed to serve political purposes.

PEACE OF MIND is one of the most important desiderata in traveling—as, indeed, it is in working, studying or any serious occupation; and Mr. Slifer, general manager of the Chicago Great Western, did the railway world a unique service when he put those words in italics in the circular to employees which he issued the other day and which we reprinted in our last issue (page 1351). We are all too ready to rest in the assumption that, as some people are bound to be worried or foolish in any event, there is no use in doing much to aid any one into a better state of mind. That is a mistake. Merely to offer to do something for a passenger, regardless of whether the offer succeeds or the passenger appreciates, greatly improves the social atmosphere on a train (if we may be pardoned so scientific a term). Everybody admires the brakeman who offers to assist passengers, whether to a seat or a drink of water or information not to be had from the folder; and this notwithstanding his propensity frequently to be too free with his advice and to make other mistakes. We other employees would do well to much oftener imitate that kind of man—avoiding his faults, of course. The other important feature of Mr. Slifer's circular is the emphasis on the duty to help all passengers, and not alone those whom it is pleasant to deal with. One of our most luxurious trains is advertised as one which will promote peace of mind by the certainty that the passenger in the sleeper will have a good night's rest. Another is put forth as a rival of the best hotels—the Astor, the Savoy and all the others rolled into one—in its capacity to cater to every possible want. But these trains, with their extra fare, are only for the few. Who will follow the C. G. W. in making this same attempt to please on all trains? We do not mean that the C. G. W. is the only road now doing this; but its circular suggests that not all of the ways of stimulating alert courtesy have yet been put into practice. The injunction to dispatchers, conductors and agents to work together is a point in the circular worthy of particular attention. Why should not the different classes be trained to stimulate each other? And the habit of being helpful to passengers can be exercised in many situations without waiting for an occasion when a train is behind time; as, for example, when, because of rain, it is neces-

sary to go through some unusual door or by some unusual path to get on or off a train without getting wet; or when, by showing passengers the right place on the station platform from which to board a train, they can be saved the annoyance of going through three or four cars to find seats.

THE railway commissioners of Louisiana propose to adopt a rule "commanding" all railway companies to answer tracers within three days. That would be simple. To give an answer is easy. But possibly the commissioners have in mind an answer which really tells what the shipper wants to know. If this is the case, the enforcement of an order like this would be likely to produce a pretty large crop of "red envelopes" on the railways of Louisiana. However, a hearing is to be held on June 25, and possibly the proposed rule will contain a "saving clause." One of the beauties of the tracer habit is that many times the shipper becomes impatient before the freight has had more than time to reach its destination. Unfortunately for the freight agents they have themselves encouraged some shippers to expect to have a telegraphic "hurry order" sent after any and every car that is claimed to be specially important. At least that phenomenon has been noticed in Illinois, Pennsylvania and other northern states, if not in the south. Big shippers being thus favored, the ordinary citizen of course feels it necessary to ask for his share. Why not make a small charge for these letters or telegrams, the money to be refunded if there proves to have been a delay? That would kill off frivolous complaints. Probably, however, it would be difficult to agree on a reasonable schedule of speeds. On many routes 99 per cent., or more, of the shipments will for a long time reach destination in good time—that is, on the quickest train schedule; but unless rates were to be raised it would be unfair to penalize the railway even in a small sum, for being slow with as much as one shipment in 500. The fact is that, except by costly improvements, it would be impossible to make the fast freight train schedule the normal schedule for all freight. An officer of the Western Union Telegraph Company, speaking of the common feeling among senders of telegrams, that on routes where an answer can frequently be had in 15 minutes the company ought to be able to get all answers in 15 minutes, says that the company is going to try to fulfil this wish or demand of the public. That is a worthy endeavor, and we shall be pleased to see it succeed; but the management of freight trains is another story. The best thing that those commissioners can do will be to adopt some rule which will impel each railway traffic manager to put the question of expedition in the hands of a man possessing the knowledge, courage and persistence (and also the authority) to remove the need of tracers as fully as possible, and to adopt sane methods in the handling of those that cannot be avoided.

THE RAILWAYS OF THE WORLD.

THE statistics compiled for the *Archiv für Eisenbahnwesen* have been brought down to include the year 1910. They show mileages for the different continents as follows:

Old World.	Miles.	New World.	Miles.
Europe	207,488	North America	283,511
Asia	63,341	South America	43,638
Africa	22,905	Australasia	19,275
	293,734		346,424

and a total of 640,158 miles for the whole globe, which is 14,460 miles more than one year before, of which increase 6,221 miles were in the Old World and 8,239 in the New. In the last decennial period, the additions amounted to 149,092 miles, 58 per cent. of which was in the New World and more than 40 per cent. in North America. How great the industry of making railways has become, and how it has grown, may be seen from the following statement of the miles opened in each decade since 1840, in which year there were 4,772 miles in the round world.

MILES OF RAILWAY OPENED IN SUCCESSIVE DECADES.

Decade.	Miles.	Decade.	Miles.
1840-50	19,333	1880-90	152,179
1850-60	43,159	1890-1900	107,421
1860-70	63,317	1900-1910	149,092
1870-80	101,081		

Thus of the 640,000 miles of railway in 1910, nearly two-thirds had been built in the last thirty years.

The *Archiv* this year gives a table of the mileage of state railways in the different countries. From this it appears that very nearly 30 per cent. of the railways of the world are worked by governments—107,746 miles in Europe, 36,365 in Asia, three-fifths of the small African mileages and 18,036 miles out of the 19,275 miles in Australasia. It is noticeable that while Great Britain has no state railways, and Canada only 1,718 miles out of a total of 24,731, this form of administration prevails in the British possessions of Asia, Africa and Australasia.

STEAM AND STREET RAILWAY CAPITALIZATION.

REPORTS of the railway commissions of two states, Massachusetts and Connecticut, supply some interesting data for comparison of steam and street railway capitalization, as well as for a comparative analysis of the latter. It should be said that the two states have differed widely in their policy toward the financing of street railways. In Massachusetts honest capitalization under pretty rigid state laws aimed in a general way at capital based on replacement value has been enforced; in Connecticut, on the contrary, the general laws have been systematically evaded by special legislation, and the state commission has been lax. The divergence of the two state policies shows in the returns. Massachusetts, with many costly city street railway lines, including the Boston elevated system, returns per mile of track of street railways, including sidings, \$63,268 capitalization in stock and debt. Owing to transfers of street railway obligations to the controlling steam railway corporation, the New York, New Haven & Hartford, the figures for Connecticut are much more difficult to obtain. But, making the proper re-transfers, the capitalization of the Connecticut street railways rises to approximately \$11,810 per mile. If the Massachusetts capitalization is taken as the standard, there is an over-capitalization in Connecticut of \$52,542 per mile.

The actual capitalization of the steam lines in the two states cannot be computed accurately, owing to investments in outside properties. But taking cost of road and equipment, the Massachusetts figures become \$45,130 per track mile and in Connecticut almost exactly the same, \$45,215 per mile. The amount per mile is obviously much reduced by the large proportion of comparatively inexpensive side track which in Massachusetts is returned as 3,222 miles and in Connecticut 1,556 miles, out of a total of 15,037 miles in the two states. But on the basis of cost of road and equipment of the steam lines the contrast with the street railways remains impressive.

Turning from the two states, where the returns are for the last fiscal year, to the whole country, the figures for street railway overcapitalization, tested by the Massachusetts figure, become amazing. From the gross returns as given by tables in the *Electric Railway Journal* we can derive the capitalization per mile of track. All New England returns \$63,466 per mile, the amount being kept down by Massachusetts, Maine (\$40,315 per mile) and New Hampshire (\$36,933 per mile). Eastern states outside of New England—Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Virginia and West Virginia—have \$157,444 per mile. Nine central states—Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio and Wisconsin—return \$101,436 per mile. Nine Southern states have no less than \$136,422 per mile, and seventeen states beyond the Mississippi, including Texas and all the Pacific states, have \$112,852 per mile. For the whole country it is \$116,795 per mile. Some of the figures for single states are impressive enough. Delaware shows \$277,687 per mile, Louisiana with \$252,627, North Carolina with \$219,113, and Oregon with

\$194,298. Evidently street railway overcapitalization is not confined to the thickly settled states or regions. In the latter category are New York state, with \$212,800 per mile, and the District of Columbia with \$205,116.

Using the mileage capitalization returns of the street railways of the whole country as a test, its contrast with steam line capitalization per mile becomes also very striking. The steam railway capitalization on June 30, 1910, was \$62,657 per mile. The street railway capitalization for the country (\$116,795) nearly doubles this. As the intercorporate holdings of the street railways are small as compared with those of the steam railway companies, the disparity with those holdings subtracted in both cases would obviously be greater still. Doubtless in the evolution of our steam lines the charging up of construction and equipment to balance capitalization has been a factor, but a very small one proportionally as compared with the street railways.

In the obvious overcapitalization of the street railways, it is to be remembered that often electric light and power capitalization is merged with street railway capital and increases it. But, even if large allowance is made, the overcapitalization of the street railways as compared with the steam lines remains noticeable—even if the allowance is as large as 20 per cent.

PASSENGER SERVICE AND EARNINGS.

THE practice of charging an extra fare on the faster and more luxurious passenger trains seems to be becoming definitely established on western railways, as it long has been on lines between Chicago and New York. The example was set by the Santa Fe when its new weekly "De Luxe" train between Chicago and California was put in service last winter on a 63-hour schedule with an extra fare of \$25. The Southern Pacific followed with a \$10 extra fare on its Sunset Limited, running twice a week between New Orleans and San Francisco; and it is announced that a \$10 extra fare is to be charged on the new Overland Limited train of the Chicago & North Western and Union Pacific, which is to be put in service shortly with a 64-hour schedule.

While competition in rates is practically extinct and maximum passenger fares have been drastically reduced by state legislation, the railways have sought to outdo each other by running faster and more elaborate trains, which have greatly increased the cost of operation. An effort was considered about a year ago to establish an additional ticket charge for passengers traveling in special equipment, but the agitation against the charges of the Pullman Company warned the railways of what would probably be the result of an attempt to adopt such a policy. Yet they have a perfectly valid argument for it in the fact that to charge the same rate for transportation in a luxurious through train on a main line as on a day coach in a slow train on a branch line, with the single exception of the charge of the Pullman Company for sleeping or parlor car accommodations, is a real discrimination in favor of the traveler in the better class of trains.

The plan of securing an increase of revenue by making a distinction in the rates for different classes of service has not been entirely abandoned. But most travelers who use Pullman cars might be inclined to protest against such action, while the American people have in many ways shown themselves not unwilling to pay more for something that is a distinct improvement over what they have been getting. Consequently, there seems less likelihood of objection to an extra fare fixed at the time the improvement is adopted. People who desire to go to California in 63 or 64 hours without the inducement of a summer excursion rate are not apt to find fault with an extra charge for superior service.

Whether there are enough who prefer such service to make it profitable has presumably been given careful consideration. The Santa Fe De Luxe was kept in service only weekly during last winter, and was intended, to a considerable extent, to accommodate travelers who often ride in private cars. It has just concluded a successful season. The North Western-

Union Pacific train will be run daily. The Chicago, Milwaukee & St. Paul also is establishing new service to the coast via the Union Pacific on the old three-day schedule and without extra fare, indicating a different policy.

It would seem wise where improved and faster trains are put in service to try to meet the increased cost by an excess fare. American railways are themselves largely responsible for holding down their passenger train earnings while increasing their passenger train expenses. There has been persistent rivalry in the running of faster and more elaborate trains, of which the new extra fare trains are illustrations. The extra fares are an indication that the roads are at last tempering their rivalry with considerations of the cost involved. In most cases the result of this kind of competition has been that the through trains have been unable to handle much local business, and passenger train mileage has been so increased that, in spite of a large increase in the density of passenger traffic, only 50 to 60 passengers are being handled per train. In 1910 the average number of passengers per train was 56. Since the decisions of the Interstate Commerce Commission refusing advances in freight rates, many roads have found it practicable to make considerable savings by taking off trains. But this has usually affected local service, and has brought many criticisms on the roads, while many have found it impossible to economize in this way.

It has often been said that no commission ever made such serious inroads on revenues as did railway men themselves during the days of unrestricted competition in freight rates; and the statistics show they are still following a similar policy with reference to passenger service. According to the latest annual reports the passenger revenue per train mile on eleven of the largest western systems ranged in 1911 between \$.893 and \$1.438, the passenger train revenue per train mile between \$1.123 and \$1.661, and the average number of passengers per train mile between 40 and 65. On fifteen of the largest systems east and south of Chicago the passenger revenue per train mile ranged between \$.945 and \$1.259, and the passenger train revenue per train mile between \$1.122 and \$1.581, while the average number of passengers per train mile was between 45 and 66.

In 1910, while the average operating revenue per train mile for all trains in the United States was \$2.24, and the average freight revenue per train mile was \$2.86, the average passenger service train revenue per train mile was but \$1.30. The average operating expense for all trains, both freight and passenger, was \$1.49 per train mile. It is very doubtful if the passenger train service ordinarily pays its share of operating expenses. It may occasionally earn operating expenses and contribute a little to interest, but usually it must contribute little or nothing to dividends. When it is considered how greatly speed increases expense and the risk of accident, the excessive competition in passenger service becomes a question of moment in a time of rapidly growing normal expenses.

NEW BOOKS.

Pennsylvania Railroad Company's New York Terminal; History of Engineering, Construction and Equipment. Edited by William Couper. Published by Isaac H. Blanchard Company, New York; cloth, 9 in. x 11 in., 101 pages; profusely illustrated. Price, \$2.

This is a carefully prepared history; brief yet quite full. The book contains pictures of all the scenes and of the principal men connected with the inception and construction of the station, tunnels, and yards, and the text consists mainly of monographs prepared by the architects and by the four engineers who were in immediate charge of the work. Some of this matter is made up from papers which the authors had presented before learned societies. The portraits of the principal men, from President Cassatt down through the engineers, contractors and others to the lower grades, are accompanied in many cases by biographical sketches. Following the text there are 30 pages of advertisements (by no means negligible) of the manufacturers and contractors who furnished the materials and did the work.

ACWORTH AND COOK ON A GOVERNMENT HOLDING COMPANY.

Interesting Discussion Concerning Some of the Problems
of Managing a Railway System of a Quarter Million Miles.

The *Railway Age Gazette* in its issue of January 19, 1912, page 82, summarized and discussed an article by William W. Cook, general counsel of the Mackay Companies, in *McClure's Magazine* for January, in which Mr. Cook advocated the organization of a gigantic holding company, a return on the stock of which should be guaranteed by the government of the United States, the directors of which should be appointed by the government, and which should take over and operate all the railways of this country. Mr. Cook subsequently issued in the form of a pamphlet, entitled "Industrial Democracy or Monopoly," his article, the comment on it in the *Railway Age Gazette*, a letter from him to this paper, which we published on February 2, and an editorial reply to his letter which was published in the same issue. A copy of the pamphlet was sent to W. M. Acworth, the distinguished English railway authority, and this called forth an interesting exchange of letters between Mr. Acworth and Mr. Cook on the subject of railway control. Through the courtesy of both writers, we are enabled to present their highly interesting discussion.

MR. ACWORTH'S LETTER TO MR. COOK.

I have received, I presume through your courtesy, a copy of your pamphlet, "Industrial Democracy or Monopoly." I need hardly say that I have read it with great interest, and with the sincere respect naturally due to anything you may write on the subject. As you are good enough to refer to me in several passages as a person whose opinion is entitled to some respect, you will, I am sure, allow me to send you my ideas.

First, as to your reference to the recent Vice Regal Commission on Irish Railways, of which I was a member, I would call your attention to the fact that the majority report, from which alone you quote, was only signed by the smallest possible majority, four members out of seven. There were four members of the commission whose title to be upon it was their practical familiarity with railway questions: of those, three refused to sign the majority report. Without desiring in any way to reflect upon the three non-railway members of the commission, for all of whom personally I have the most sincere respect, I think I am entitled to say that the political rather than the purely railway aspect of the question was uppermost in their minds.

Now to come to your proposal itself. First and foremost, I cannot believe that its adoption is within the sphere of practical politics, *natura non facit saltum*. I am convinced that further railway legislation is not likely to depart in so revolutionary a manner as you propose from the lines hitherto followed. I cannot imagine hundreds of legislators and millions of voters ready to vote for so tremendous a leap in the dark. I am getting an old man and have learned by experience to expect that the unforeseen consequences of a new departure will be more important than the foreseen; so that my sympathies would be on the side of the average voter in his hesitation.

But, further, I cannot see that your scheme would work. It appears to me that an essential prerequisite would be the repeal of all existing railway restrictive legislation, and the abolition of state and interstate commissions. This I cannot imagine the public would stand. And, indeed, you appear to contemplate the continuance of at least the Interstate Commerce Commission, for you suggest its exercising certain powers. Now it seems to me unreasonable to suppose that men of the character of your proposed directors would give their lives to an extraordinarily difficult and invidious task if they were liable to be pulled up by the ill-informed poli-

ticians who form so large a proportion of the personnel of the state railway commissions.

Again, I do not see how you are to get and keep your ideal board of directors. I run over in my mind the names of half a dozen personal friends of my own, who I think ought to be on it. They are probably at present in receipt of salaries of \$50,000 or \$75,000 apiece. You could hardly expect them to accept the salary of a justice of the Supreme Court, while continuing to pay the existing scale of compensation to their own subordinates, the presidents of the controlled roads. Yet, I cannot imagine the American public paying the railway director five times the Supreme Court scale.

Nor can I understand how one board could really control. If they are to act as a board they must meet constantly in one place. That place must be, I presume, New York or Washington, and this seems to me to make it impossible for them to keep abreast of local conditions in Texas or California.¹ It seems to me that the theoretic arguments for local autonomy of railways in a country as large as the United States are just as strong as those for the co-existence of the state and federal governments.

I am unable to follow your financial calculations. Surely it is inconceivable that, even with a federal guarantee, 25 billions of stock could be sold at 3 per cent. Put it at 4 per cent. interest, and the margin for reduction of rates and improvement of facilities is enormously reduced. Moreover, I cannot think that shareholders would be willing to sell, or could equitably be forced to sell, on the basis of present prices. I have been a holder for many years of Pennsylvania common stock, and, if the United States government offered to give me \$63 a share for my property, I should answer: "Certainly not. I have been content for many years with a moderate dividend. And out of revenue we have built up an undertaking whose road stands in the books at \$120,000 a mile, whereas it is probably worth twice or thrice that figure to reproduce. Pay me the real value of what you take, and not the capitalized value of that portion of the real earnings of the property which we have chosen to divide year by year." I see no honest way of avoiding this claim. You have only to compare the price paid by the Swiss government for the Swiss railways, and still more recently by the French government for the Western of France, to see the wide discrepancy between expectations and actualities when a government comes to buy.

But, assuming, for the sake of argument, that there would be a large surplus, I do not envy the directors the task of disposing of it. On the one hand, why should the citizens of Pennsylvania send millions of surplus per annum to help reduce the railway rates in Oregon? On the other hand, how could a board representing the nation make special reductions of rates in Pennsylvania, and so still further increase the differential disadvantage of Oregon?

I must refrain from further discussion. I trust you will forgive the frankness with which I have spoken. I think we can both agree that the problem is one of quite first-rate importance, and that everything which will arouse public interest in its solution, and educate the man in the street to appreciate the importance of preventing fools rushing in with 2-cent fare proposals, is altogether to the good.

MR. COOK'S REPLY TO MR. ACWORTH.

I am glad, indeed, to know the first impressions which my proposal makes upon a conservative English mind, and inas-

¹The directors of the Bank of England meet every week, and I believe one or two other directors on a rota are expected to be in daily attendance. And, I believe, directors, even if not on the rota, as a rule keep in almost daily personal touch with current business at the bank.

much as you ask me to forgive the frankness with which you write, I am sure you will give due consideration to my reply, especially as you raise serious objections to my plan to bring about a more equitable division of the profits of industry, especially of the railways. I would answer your objections as follows:

You refer to the fact that the politicians outvoted you on the subject of government ownership of the Irish railways in the Vice Regal Commission to which I referred in my article. That is exactly what the politicians will bring about here, unless we forestall government ownership by something better. You strengthen my argument. The politicians are too many for us. Moreover, judging from the present rapid progress of the German nation towards state socialism, it would seem as though we must work out some new form of industrialism or drift irresistibly towards the same state socialism. Old conditions are being rapidly outgrown. I gather from your writings that you think that government ownership of the railways is impending. Why not try to substitute some new form of control by investors?

You say my plan is revolutionary and a leap in the dark, and you think the public will not have it. That certainly is a severe indictment. But is it so revolutionary? The revolutionary program is government ownership, towards which you, yourself, in your writings say we are drifting. The maxim you quote that nature makes no leaps certainly does not apply to my proposal, inasmuch as I am merely applying to all the railways the holding company plan which at present they are applying among themselves. My plan is an evolution without a hiatus, much less a leap. It may be, as you say, that the millions of people in this country will not vote for it. But they may rather than have government ownership. The Americans are bold when convinced. The past 136 years have demonstrated that.

You do not think that the public would consent to abolish present state and interstate commissions. I did not suggest or intend abolishing them. The Interstate Commerce Commission and the state commissions under my plan would continue to supervise a very large amount of administrative detail business, but another large part of their present business would cease to arise by reason of unity of interests, especially as to regulating stock and bond issues, etc. The ill-informed politicians to whom you refer would be outranked by the board of directors of the national holding company.

You mention that the holding company directors would be men who at present are receiving \$50,000 to \$75,000 annual salaries, and that it would not do to pay them, as directors of my holding company, that salary as compared with what we pay our justices of the Supreme Court of the United States. The answer is that our justices of the Supreme Court bench are content, although any one of them could tomorrow by retiring to private practice get an income five or ten times as great as he is now receiving. Able and honest men in America take high and responsible governmental positions at a much less salary than they could earn in private life. It is entirely possible to obtain proper directors at a reasonable salary. The mere fact that these directors would be paying their subordinates (namely, the presidents of the railways) a higher salary than they themselves were getting would make no difference, just as it makes no difference that justices of our Supreme Court listen to the arguments of lawyers who are receiving five or ten times as much pay as the justices themselves. This alleged difficulty of getting 25 competent and honest Americans to act as directors is very much exaggerated. Naturally, the old regime thinks that its little group alone are capable of properly serving as directors of the railways. The court records and a recent congressional report show that the president of the First National Bank in New York City is a director in 57 corporations, having an aggregate capitalization of over five billions of dollars. If he is able to attend to the duties of 57 boards of directors, involving

many and diverse kinds of business, including railways, why should not 90 millions of people be able to produce 25 directors who would devote their time to one board of directors, controlling but one line of business, namely, the railways? I have too much faith in my fellow countrymen to believe that it would be difficult to get 25 men who could run our railways fully as well as they are run now.

You point out that the board of directors would have to meet constantly in one place, probably New York or Washington, and this would keep them out of touch with local conditions throughout the United States. Are the present boards of directors of the railway companies in touch with local conditions? They are almost a humorous paragraph, except as to finances. They know nothing about the local conditions as a rule, except as the president and general manager inform them. Furthermore, I think you hardly caught the idea of the duties of my proposed board of directors of the holding company. Their chief duties would be to keep the proper officers and staff in charge of the different railway corporations. The latter would look after the railways and local conditions, the same as they do now. Furthermore, I believe that a body of men, controlling the whole field, would act more intelligently on the large questions of railway extensions, improvements and policy, by sitting in Washington, than the present boards of directors of railways do, who hold occasional meetings in New York. I agree with you that the local autonomy of railways in America is as important as the co-existence of state and federal governments. But where do we have any such local autonomy at present, so far as the boards of directors are concerned? The railways are now controlled in and about Wall street, as you know, and so far as the railway staff constitutes local autonomy, that would be preserved under my plan.

You mention that you are unable to follow my financial calculations, but apparently you refer only to the difficulty of selling \$25,000,000,000 of 3 per cent. stock. You overlook the fact that only a very small part of this 25 billions of stock would be issued, under my plan, during the next few years, and the balance would be issued gradually thereafter. Furthermore, the holding company would not *have* to raise any particular amount at any particular time. Its action would be largely automatic in selling its stock and buying the railway stocks when opportunity occurred. There would be no necessity for quick or forced action. The fact also that the people parting with their present railway stock would have to invest the money in something else and would probably invest much of it in this government stock, and the fact that savings bank money and government post office deposits would flow largely into this government guaranteed 3 per cent. security, would justify, I think, a confident belief that the money would be forthcoming on a 3 per cent. basis.

Your argument that as a holder of Pennsylvania Railroad Company stock you should receive more than its present value (\$126 for a double share) is an argument I can understand, but in which I cannot concur. I also am a stockholder in the Pennsylvania Railroad, and a very substantial one. I, with you, have been content for many years with the dividends paid, but I would not call them "moderate." I would call them a full, fair return on the money, and would consider that I have been properly treated, even if I sold my stock tomorrow at the market price. The income has been a very good one (about 5 per cent. on the average, besides "rights" on increased capital shares), in view of the high class of security accompanying it. If that stock were taken over by the government at present market prices why should we have something extra for the past earnings of the railway which have been put into improvements? The present market value of the stock represents not only the dividends but also the security of the investment, by reason of past profits used for improvements. A 6 per cent. stock does not sell in this country at 126, except for high safety, and that safety represents past profits invested in improvements, and hence if you should sell at 126 you would already be getting

the value of past profits invested in the plant. Furthermore, larger profits in the future will be due in large part at least to future good management of the property and increased population, general wealth and traffic of the country, and why should you and I be paid for them now in anticipation? We are entitled to an income on our investment and to the market value of the shares, but why should we expect an *increased* income so far as it comes from the work of others and from increased wealth, population and traffic? Have you and I earned it, or are we simply investors, doing nothing as to that particular railway to increase its traffic and profits? To my mind we should be content with the present good income from our past investment. Practically, however, whether we are content or not, I think it is all we shall get. Already the Pennsylvania Railroad has had to abandon its old policy of a dollar for improvements for every dollar paid in dividends. Increased expenses, increased terminals, public demands and Interstate Commerce Commission decisions render impossible, I think, any hope of more than 6 per cent. or 7 per cent. dividends on that stock, and yet I believe it the best railway stock of them all. Let us cherish no illusions or theories on that subject. Some day we may be glad to exchange our stock at 126 for a government guaranteed 3 per cent. stock at par, which would net us about $3\frac{3}{4}$ per cent. on our present investment and would be worth in the market as much as or more than our present Pennsylvania Railroad stock. I would gladly turn mine in tomorrow and avoid the nightmare of doubt, especially as I could get the principal at any time as easily as now.

Finally, you suggest, for example, that the citizens of Pennsylvania should not have their surplus railway earnings used to reduce rates in Oregon, and that the board of directors, which I suggest, could hardly reduce rates in Pennsylvania, thus increasing still more the differential disadvantages of Oregon, and you say you would not envy directors who were called upon to dispose of the large surplus earnings. The answer is that railway surpluses in America are like snakes in Ireland. They cannot be found. Substantial dividends are paid out by the railways with the one hand, while with the other hand hundreds of millions of dollars are taken in by the issue of new stock and bonds. If my plan were in force the policy pursued would be the plan now pursued by the Mackay companies, namely, the holding company would take only such money from the railway companies as would be needed to pay the 3 per cent. dividends on the holding company's stock, leaving the balance with each particular railway to meet its financial necessities. The saving worked out in my article would not appear in the way of distribution of surplus, but would appear in the way of decreased applications for fresh money. This question of differentials would be left where it is now, namely, with the railways, subject to regulation by the Interstate Commerce Commission, and we would be spared the present interminable litigation over the decisions of the commission. Moreover, government ownership would be faced with the same problem, and have you considered that New York does not complain that its two-cent local postage produces a large surplus that enables Oregon to have cheap postage?

In closing I wish to say that I am not at all insistent on the merits of my particular proposal. But the trouble is that no one else is proposing anything else. The old regime seems to think it sufficient to resist stubbornly and believes stupidly that present conditions can continue indefinitely. This does not apply to you, because your writings show that you see government ownership looming up in the near future. To my mind the undercurrents are changing rapidly. Unless something is done to interest the masses in the preservation of the institution of private property we shall go to state socialism. I believe that my proposal will avoid this. I believe—

First, that the present mode of industrial organization is being outgrown and will be discarded.

Second, that nothing has been proposed in lieu thereof, except state socialism.

Third, that it is possible by utilizing the corporate form of organization, with a government guaranty of dividends, to interest the masses in the railways and all other great industries, thus avoiding government ownership and state socialism, and at the same time bringing about a more equitable division of the profits of industry, especially of the railways.

THE UTILITY OF FLUE GAS ANALYSES IN LOCOMOTIVE TESTING.

BY LAWFORD H. FRY.

During the year 1907 the Carnegie Institution of Washington, published a report on High Steam Pressures in Locomotive Service; in 1910 it issued a report on Superheated Steam in Locomotive Service. Both of these were studies by Dr. W. F. M. Goss of elaborate series of tests made by him on the locomotive testing plant at Purdue University. All of the tests were made on the same locomotive, but the boiler delivered saturated steam for the first series of tests and superheated steam for the second, the boiler being changed to include a Cole superheater. The total heating surface of the boiler in the first case was 1,322 sq. ft., and by the addition of the superheater the evaporating surface was reduced 299 sq. ft., while 193 sq. ft. of superheating surface were added, making a total heating surface of 1,216 sq. ft., with a net reduction of 106 sq. ft., or 8 per cent. of the original surface.

As the superheater boiler has less heating surface, and as the coolest part of the superheater surface is necessarily at a higher temperature than the coolest part of the original boiler heating surface, it would be expected that the superheater boiler would be the least efficient. As a matter of fact, when comparing the results obtained, Dr. Goss says: (Superheated Steam in Locomotive Service, page 75):

"The boiler designed for delivering saturated steam gave an efficiency expressed by the equation:

$$E = 11.305 - 0.221 H \dots \dots \dots (1)$$

while the boiler equipped with the Cole superheater gave an efficiency expressed by the equation:

$$E = 11.706 - 0.214 H \dots \dots \dots (2)$$

E is the equivalent evaporation from and at 212 deg. F. per pound of dry coal, and H the equivalent evaporation per hour per square foot of total heating surface, including superheater surface where this occurs.

"Obviously, on the basis of these equations, the superheating boiler has the advantage."

As the equations are not strictly comparable on account of the different amounts of heating surface in the two boilers, a comparison was made, as in Fig. 1, on the basis of total power

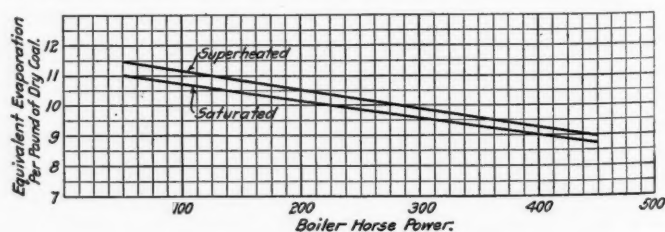


Fig. 1—Boiler Efficiency Curves.

delivered by the boiler, and commenting on this, Dr. Goss said: "It will be seen that even upon this basis the efficiency of the combined boiler and superheater is superior to the boiler alone, the increase averaging between three and four per cent. The reason for this is not entirely apparent. An examination of related data suggests that the lines of the figure should not be far apart. Draft values . . . reduced to equivalent values representing equal . . . power output . . . are identical for both locomotives"—indicating equality for both in the amount of coal lost in the form of cinders and sparks. "Similar comparisons involving smokebox temperature lead to identical conclusions. Upon the basis of these statements the relation defined by Fig. 1 is not confirmed by collateral evidence."

Before using the flue gas analyses to elucidate these tests, our

first task is to remove the conflict of evidence between the measurements of the boiler efficiency and those of smokebox temperature and draft. To this end Fig. 2 has been drawn, the

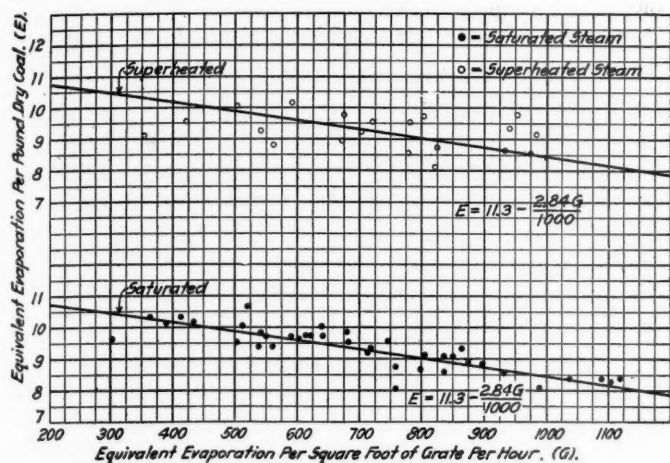


Fig. 2—Boiler Efficiency in Relation to Rate of Working.

equivalent evaporation per pound of coal being plotted in relation to the equivalent evaporation per square foot of grate surface per hour. The results for the superheater boiler are shown in the upper part and those for the saturated boiler in the lower part of the diagram. The lines in both cases correspond exactly to equation (1) proposed by Dr. Goss, and apparently this same equation applies with equal accuracy to both types of boiler. It seems that Dr. Goss's choice of the higher value for the efficiency of the superheater boiler, as given by equation (2), was due to his having neglected some of the superheater tests which showed low boiler efficiencies.

By adopting the same line as representative of the boiler efficiency in both boilers, we follow a course which is supported by the evidence obtained from the smokebox temperatures, etc. It still remains to be seen how, in comparison with the saturated steam boiler, the superheater boiler with eight per cent. less surface can show an equal boiler efficiency. The difference might be due to the superheater surface being more efficient than the tube surface it replaces, but in view of the higher temperature of the steam to which the heat is transferred this appears unlikely, and as will be shown the results of an analysis of the conditions of combustion and heat absorption offer a simpler explanation. Before describing the results, the method of analysis developed by the writer will be described in outline, a detailed description of the various calculations being reserved for a later article.

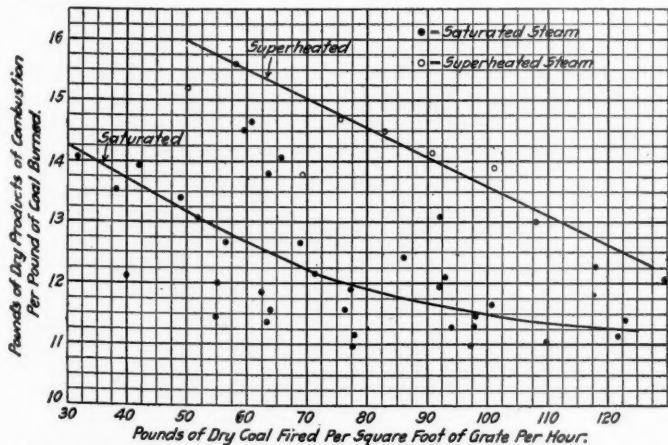


Fig. 3—Weight of Dry Products of Combustion for Different Rates of Combustion.

The starting point is the flue gas analysis, and the first step is the determination, from this analysis, of the weight of the dry products of combustion. These weights for the tests now under consideration are given in Fig. 3. Taken in conjunction with the

smoke-box temperatures which are plotted in Fig. 4, and which, as stated by Dr. Goss, are practically identical in both boilers, the weight of the products of combustion enables us to calculate the

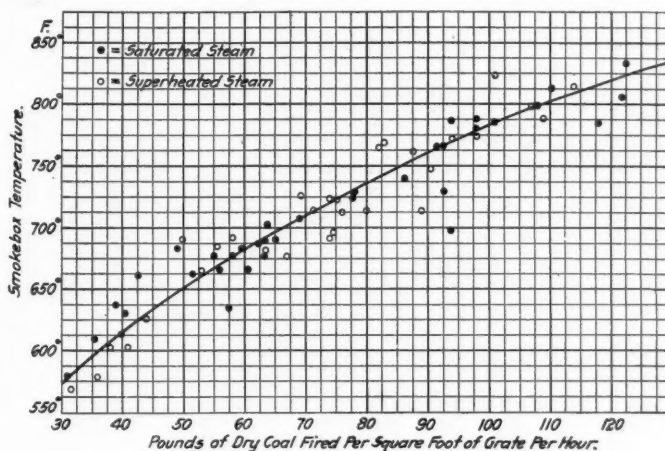


Fig. 4—Smoke-box Temperature for Different Rates of Combustion.

amount of heat carried out of the boiler by the smoke-box gases. Take a particular case and suppose that for every pound of coal burned 16 lbs. of gases escape at 700 deg. F. Then, if the air admitted to the furnace has a temperature of 70 deg. F., the loss of heat in the dry gases, since their specific heat at smoke-box temperature is about 0.24, will be $0.24 \times 16 \times (700-70) = 2,420$ B. t. u. If the water vapor produced by combustion carries another 480 B. t. u., the total loss in the smoke-box gases will be $2,420 + 480 = 2,900$ B. t. u. per pound of coal burned, and if the coal contains 14,500 B. t. u. per pound, this is 20 per cent. of its heating value.

That is to say, under the conditions assumed, each pound of coal actually burned in the firebox produces 14,500 B. t. u., and of this heat 2,900 B. t. u., or 20 per cent., is carried off by the smoke-box gases. The remaining 80 per cent. of the heat produced must be taken up by the boiler heating surface. This 80 per cent. measures the efficiency of the heating surface, or the efficiency of absorption of the heat produced. It is not identical with the boiler efficiency, because some of the coal fired escapes unburned, and hence the heat produced by the coal actually burned is less than the heat in the coal fired.

We cannot measure directly the amount of heat produced, but the author's method of calculation gives a simple method of determining this, and consequently the efficiency of combustion, by measuring the heat in the coal fired and the amount of heat absorbed by the boiler, the latter including the heat used in evaporation and that lost by external radiation. If, in the case under consideration, we find a boiler efficiency of 65 per cent., that is, that 65 per cent. of the heat in the coal fired is used in producing steam, about 3.0 per cent. additional will be lost by external radiation, so that 68 per cent. of the heat in the coal fired is absorbed by the boiler. But it has been seen that the heat absorbed is 80 per cent. of the heat produced, hence 68 per cent. of the heat of the coal fired is equal to 80 per cent. of the heat produced, from which we find that the heat produced is 85 per cent. of the heat in the coal fired.

It should be noted that the simple and direct calculation described above enables a heat balance to be established without it being necessary to measure the coal lost as sparks and cinders. In the foregoing example 85 per cent. of the heat in the coal fired is produced in the firebox, so that the remaining 15 per cent. is lost by incomplete combustion. The heat balance will then run

Heat used in producing steam.....	65 per cent.
Heat lost by external radiation.....	3 per cent.
Heat lost by temperature of smoke-box gases	
(20 per cent. of 85).....	17 per cent.
Heat lost by incomplete combustion.....	15 per cent.

Total heat in coal fired..... 100 per cent.

The losses by incomplete combustion calculated by this method

from the data of the Purdue tests agree closely with the losses as actually determined in the tests by measurement of the sparks, cinders, etc.

To apply this to the elucidation of the meaning of the Purdue

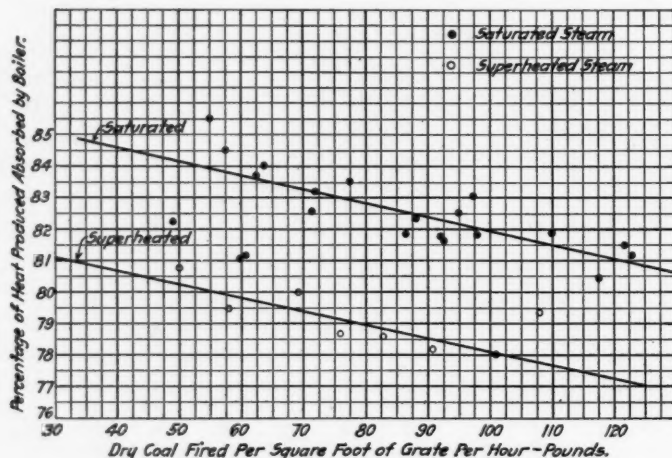


Fig. 5—Efficiency of Heat Absorption.

tests, Fig. 5, was plotted to show the efficiency of absorption of the boilers. That is, the percentage of the heat produced which is taken up by the boiler is shown in relation to the rate of working of the boiler. From the efficiencies of absorption heat balances have been calculated and are represented in Fig. 6. The

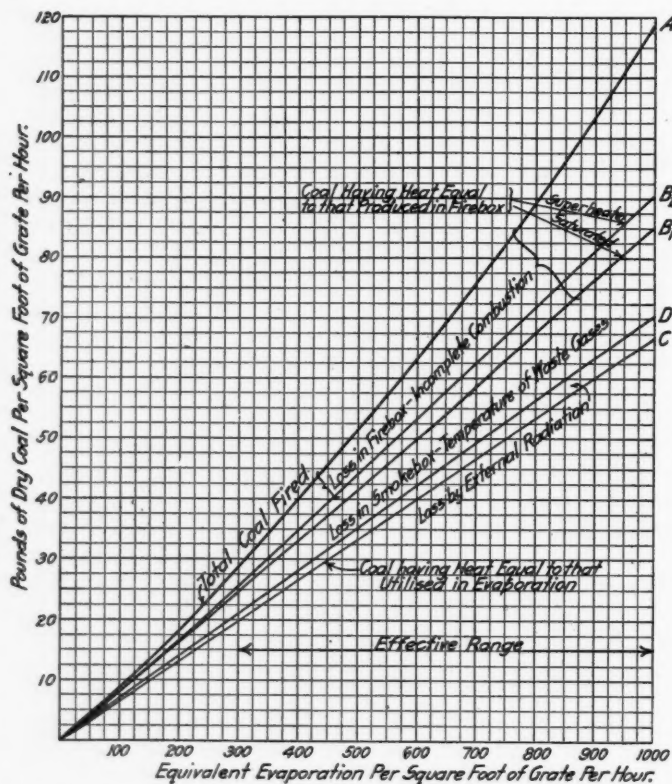


Fig. 6—Diagram Showing the Distribution of the Heat from the Coal Fired.

horizontal scale in this diagram indicates the output of the boiler in terms of the rate of equivalent evaporation, that is, in pounds of water from and at 212 deg. F. per hour per square foot of grate area. The vertical scale measures heating value in terms of pounds of coal, each pound having a heating value of 14,500 B. t. u. The upper curve *A* shows the total amount of coal fired per square foot of grate per hour. Since both boilers have the same efficiency, the same amount of coal must be fired in either boiler to produce a given evaporation. A single curve *A* serves therefore, for both boilers. The lowest line *C* shows, by its distance above the horizontal base line, the amount

of coal having a heating value equal to the amount of heat employed in producing the steam. As each pound of water evaporated from and at 212 deg. F. requires 966 B. t. u., and as each pound of coal contains 14,500 B. t. u., the heat of one pound of coal will be equivalent to the evaporation of 15 lbs. of water, and consequently *C* is a straight line rising one unit (one pound of coal) on the vertical scale for each 15 units (pounds of water) advance along the horizontal. The line *D* is drawn 5 per cent. higher than *C*, the distance between them representing the amount of heat lost by external radiation and leakage. Then the distance of *D* from the horizontal base line measures the total heat taken up by the boiler. The lines in Fig. 5 show what percentage this is of the heat actually produced in the firebox, and it is therefore a simple matter to determine the position of the curves *B*₁ and *B*₂, which, by their distance from the horizontal, mark respectively for the saturated and for the superheated steam boilers, the amount of heat actually produced in the firebox. Then obviously the distance between *B* and *A* on any vertical must measure for that rate of evaporation, the amount of coal the heating value of which is lost unburned from the firebox, and similarly the distance between *B* and *D* must measure the amount of coal, the heating value of which is equal to the loss in the smokebox by reason of the temperature of the smoke-box gases.

Now it is clear from Fig. 3 that at any given rate of evaporation the boiler with the superheater takes more air through the fire and it is in consequence of this that, as shown in Fig. 6, the combustion is more efficient than in the saturated steam boiler. The same amount of coal is fired, but the larger air supply enables more coal to be effectively burned, and thus more heat is produced.

This heat is, however, less efficiently absorbed, owing to the smaller heating surface of the superheater boiler, and though more heat is produced, only the same quantity is absorbed and utilized in the steam production. It is probably merely by chance that the gain in efficiency of combustion so nearly offsets the loss in the efficiency of absorption. Further, and most important, if the smokebox arrangement of the saturated steam boiler could have been improved so as to take as much air for a given rate of evaporation as the superheater boiler did, the efficiency of combustion would have been improved and the over-all boiler efficiency would have been higher than that of the boiler with the superheater.

Herein lies the value of the flue gas analyses. They enable the boiler efficiency to be divided into its component parts—efficiency of combustion, and efficiency of heat absorption. It will in general be found that the efficiency of absorption varies only slightly; in the present case it is between about 81 and 85 per cent. in the saturated steam boiler and between 78 and 81 per cent. in the superheater boilers throughout the range of tests. On the other hand the efficiency of combustion shows considerable variations, decreasing rapidly as the output of the boiler is increased. It is desirable when testing a locomotive to see whether abnormalities in the action of the boiler are due to defects in the efficiency of combustion or in the efficiency of absorption. The former is the more sensitive and usually offers opportunities for improvement. Information on this point can only be obtained by knowing the amount of air passing through the fire, and for this flue gas analyses are necessary.

The projected line from Beira, South Africa, to the Zambesi river, which is known as the Sena railway, has been in contemplation for a number of years, and the construction may be begun this year. This line, which will eventually link up with the railway in Nyasaland, would be of great benefit to the port of Beira, as well as to the territory of the Mozambique Company. Such a railway would open up the rich country between the Buzi river and the Zambesi river, besides affording Nyasaland an easy communication with an excellent harbor.

FUNDAMENTAL PRINCIPLES OF RAILWAY STOREKEEPING.

An Argument for departmental organization; the Storehouse a "Storage Battery Floating on the Power Line."

BY GEORGE G. YEOMANS.

There are in reality only two ways in which the materials belonging to a railway can be handled and accounted for with any degree of success.

First, where each department has exclusive jurisdiction and control of the material which it requires for its own use.

Second, where one department has absolute and complete control of all material belonging to the company that is not in actual use—whatever its nature or wherever it is located.

Any attempted modification or commingling of these two methods is at best a makeshift, and like all half-way measures, is always ineffective and uneconomical.

The first of these two methods is the one originally adopted by the railways, and was in reality a natural consequence of existing conditions. Instead of being the result of any well-defined plan, it "just grew." It answered all purposes when the railways were small and compact properties, whose entire operations could easily be supervised in detail by a few individuals, and when their investment in material could be designated in thousands, instead of millions.

More than thirty years ago, as the railways began to expand more rapidly, they recognized the defects of this system as applied to the purchasing of the material which they used, and they began to concentrate the function of buying in the hands of one individual. The advantages of this arrangement have gradually made themselves so apparent that more and more authority has continued to be placed in the hands of the purchasing agent, and on many of the larger railroads he has become an officer of considerable importance.

Just why the railway executives should recognize the importance of this principle as applied to the mere buying of material and then fail to apply the same principle to the more important features of caring for and disbursing the material after it belongs to them, is difficult to understand, although one explanation may be found in the fact that the duty of looking after material was originally conceived to be the duty of a servant. Neither physical nor mental qualifications were thought to be required in a man who only "looked after material." If he was fit for efficient work in the office or on the road, at the bench or on the track, that was where he belonged; not in the storehouse.

To this fact also is due the idea, which is still prevalent to a large extent, that the work of caring for and disbursing material can be properly performed by low-priced labor, and that less ability is needed for work of that character than is required in the successful management of the other departments.

In turn, this idea has reacted on the service, and is largely responsible for the unsatisfactory results which a majority of railroad executives are conscious of but seem to be at a loss to correct.

It requires as much brains and ability properly to provide, care for and disburse material on a division as it does to properly perform the duties of chief clerk to a division superintendent or master mechanic, and this fact must be recognized and accepted if increased efficiency is to be obtained in the handling of supplies.

This same idea has also led to a very general misconception, on the theory that those in actual charge of any work involving the use of material can best determine the kind, quality and amount of material necessary, as well as when and how it can best be used. This theory is absolutely correct, but it does not follow that they can also determine how it can best be procured or most advantageously supplied. As a matter of fact, they can not do this so well as the man whose time and attention is given to that one duty. It is this misconception, however, that has led many to the conclusion that the head of each department must control the material pertaining to his particular work, either inde-

pendently or through the medium of a powerless storekeeper, and it is this conclusion that has been largely responsible for the indifferent accounting, excessive stocks and waste of material of which executive officers so frequently and justly complain.

In this way "storekeeping" came to be a despised occupation. It is not greatly to the credit of railway executives that the storekeeper has remained a neglected nonentity for so many years. The need for improvement in respect to all matters pertaining to material has been vaguely felt for a long time, but owing to the low type of intellect that had been employed in the practical work of handling material, there has been no one to offer any valuable suggestions from that important standpoint. On the other hand, there has been no lack of officials, who had never done a day's work in a storehouse or who perhaps had never seen one, but who were ready with theories and advice as to how material should be handled and accounted for.

The demand for improvement became so urgent that frequently the most ridiculous ideas were eagerly seized upon and put into effect, abandoned, and some other equally impractical methods substituted, and still the hoped-for improvement failed to materialize.

Finally, the fact that there had been a great improvement in the purchasing of material began to dawn on the railway managers. With strange perversity, they ascribed this improvement to the man, and not to the method. They reasoned that he ought to know something about the distribution and use of material, because he knew what it cost, and, therefore, decided that the way to get the results they were after was to put the purchasing agent in charge of the custody and disbursement of the material.

The purchasing of material is an important detail in the procuring and handling of supplies on a large railway, but it is only a detail. It does not even involve "procuring" material in its broadest sense.

The most important matter in connection with anything is not the *getting* of it, but the care taken of it and the use made of it after it is acquired. In an efficient organization, therefore, the chief supply officer should have the purchasing agent as a member of his staff, to assist in providing the material which he must procure.

"Procuring" material, in its proper sense, involves the originating of the requisitions on which the purchasing agent acts, as well as the control of internal sources of supply maintained and operated by the company, either directly or through the agency of officials of the other departments.

A second member of his staff should be an officer in general charge of the custody and disbursement of material, and this branch of the organization should be developed in the manner best suited to meet the local requirements of the service.

The authority of the chief supply officer should be absolute with respect to the procuring, custody and disbursement of all material used by the company, and his responsibility should be co-extensive with his authority. His jurisdiction and that of his staff should extend to all material of whatever nature, or wherever located, that is not in actual use.

A properly organized supply department must of necessity be departmental in character in order to obtain the greatest efficiency. It is the only branch of the operating service which is not susceptible of divisional organization without serious impairment of its effectiveness. This is because the department has really only one function—the economical handling of supplies, embracing the providing, distributing and conserving of material.

The activities of all of the other operating departments may properly have a beginning and an ending on the operating division with the exception, perhaps, of some of their minor func-

tions; such, for instance, as the function of the mechanical and maintenance of way departments of establishing and maintaining standards on all divisions, which is a departmental and not a divisional function. Such, also, is that important function of the transportation department which deals with the distribution of equipment.

The efficiency of the railway as a means of transportation would be at least partly destroyed if the authority of the superintendent of transportation was confined to the limits of an operating division with respect to the distribution of equipment. So it is with the distribution of material, which is, perhaps, the main function of the supply department, and certainly the most important one with respect to the efficiency of the railway as an operating entity. It is only by means of such an organization that the chief supply officer can intelligently control and regulate the amount of material carried in stock, and on this regulation depends his success or failure.

The cost to the company of delays to the normal progress of any work through lack of the proper material with which to carry it forward without interruption, or the necessity of employing makeshifts, or of temporarily transferring its forces to some other location, can not be calculated. On the other hand, the effect of an excessive stock of material on operating expenses can not be reckoned in terms of interest on the investment. In addition, there are the costs of transporting the unnecessary material over longer or shorter distances; the labor of handling it at the storage points; the loss through depreciation, and obsolescence of unused material; taxes; insurance; and, finally, the more fasteful use of material because of its abundance.

The amount and kind of material that must necessarily be carried in stock depends solely upon the amount and kind of material that is actually used in any given period, and it can depend on nothing else. It, therefore, becomes a prime necessity to the chief supply officer to have an accurate knowledge of the current consumption of material, and to that end the accounting methods must be as correct, simple and concise as possible. The exact facts must be set forth. There must be no self-deception through any effort to show efficient performance on paper, or to make an individual record at the expense of the company; conditions which may be said to exist on many railways today.

A properly classified stock account is indispensable as a foundation for such accounting, and in the interests of uniformity in such matters among different companies, the general form recommended by the Railway Storekeepers' Association, modified in details to suit individual preferences, so long as the underlying principle is maintained, may be used to advantage.

The actual consumption of each class of material should be closely studied each month, and upon the information so obtained, in connection with constant consultation with the heads of departments in regard to work in contemplation or proposed changes in current operations, the chief supply officer can so regulate his stock of material as to meet the requirements of the service without an excessive reserve.

A prevailing misconception of the true function of a stock of material in its relation to current operations is that the storehouse acts as a reservoir into which the material is poured and from which it is drawn off as needed for use, or that, like a storage battery, it is charged during a certain period in order to be discharged later at a point remote from the source of current. It is this misconception which is at the bottom of the unnecessarily large accumulation of material found on so many railways, and which forms a source of so much expense to the company and so much anxiety to the managing officials.

As a matter of fact, on every railway large amounts of material are being received each day, and with a well organized supply department it is coming in as nearly as possible in conformity to the requirements of the work, and moving forward to the place where it is needed.

In any sufficiently long period—a year, for instance—there is as much material received as is used. It cannot be otherwise. More may be received than is used; but never less.

The ideal condition would be to receive each month just the kind and quantity of material required for that month and pass it directly to the spot where it is needed, without delay. In such a condition, no stock of material would be required. Because such a condition is impossible, a stock becomes necessary, to provide against contingencies which may arise, and prevent delays to the work through the temporary failure of material to arrive when it is expected.

It is evident, therefore, that instead of acting as a reservoir, the storehouse is in reality a standpipe, taking up inequalities, regulating the pressure on the flow of material from the factories and mills to the work, and keeping the stream constant and effective; or, to revert to the other simile, it is a storage battery floating on the power line, receiving a portion of the current in times of minimum stress in order to help carry the peak load when it develops. The necessity, therefore, for a stock of material sufficient in itself to supply the entire requirements for any given period, is problematical, to say the least.

The assertion that the supply department of a given road is being operated on one month's, two months', or three months' supply, is frequently heard; but beyond forming a basis for computation or comparison, it means nothing with respect to efficiency.

When this true relation of the stock of material to current operations is once clearly understood by all concerned, the fear that the railway may have to suspend operations unless it has in reserve a sufficient amount of all kinds of material to run it for two, four, or six months, will be dispelled, and to this fear on the part of both managers and subordinates is due a much larger investment in material than is at all necessary.

The principles involved in the successful handling of railway material may, then, be summed up as follows:

1. The concentration of all authority and all responsibility with reference to all material of every description that is not in actual use, in the hands of a single department which should have no other duties to perform, and whose only interest should lie in properly providing for the wants of the other departments, and in carefully guarding and accounting for the material entrusted to it.

2. The employment generally of higher grade and more capable men in charge of division storehouses than are ordinarily found in such positions at present.

3. The simplification of accounting methods and the retention of all material in the stock account until it is actually used, in order to remove the temptation of making a record for the department at the expense of the company; to avoid duplication of work, and minimize the chance for error. The adoption of a classified stock report in the interest of accuracy and uniformity and as a basis for determining the amount of stock that is necessary to carry on hand.

4. The intelligent regulation of the stock of material on the basis of actual consumption, instead of on the estimates of various officials as to the amount which they consider necessary or on any theory as to the quantity that should be carried in reserve.

The supreme test of the efficiency of such a department is its ability to procure and deliver to those engaged in the manifold operations of the railway, all of the necessary material as, and when, it is required for use, so that there shall be no delay to the normal progress of the work through lack of the proper material with which to carry it on; and the most successful supply officer is the one who, by close and intelligent supervision, so regulates his stock of material as to meet this test with the lowest percentage of fixed investment and the smallest operating costs per unit of material handled.

The construction work on the Transcaucasian Railway, Russia, will be begun immediately, and will be pushed forward rapidly at the expense of the government. This railway will shorten the journey between Tiflis and central Russia by 576 miles. It will also simplify communication between Persia and Turkish Asia.

COMMERCE, THE COMMISSION AND THE COURTS.*

BY LOGAN G. M'PHERSON,

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When the railways came into existence they were as a matter of course subject to the existing law. A most important part of the common law is that which relates to property, the rights to property, the conditions under which property may be held and transferred. The right to the use and enjoyment of property lawfully held is one of the fundamental rights guaranteed to the American citizen by the Constitution of the United States and the law of the land. The railways in the United States are private property and as such those who hold title to them are entitled to their use as property and are entitled to be protected in that use by the law and the government.

It is also true that the railways are "affected with a public use." It is because of the public nature of their services that the railways were accorded the power of eminent domain which almost continuously has been referred to as the reason that they should be subject to public regulation. It ought to be recognized, however, that the real basis for this regulation is the economic power of the railways, which was not foreseen when the original charters were granted. The distinction between the private rights and the public obligations of a railway have not even yet been definitely and finally determined.

So recently as October, 1876, the Supreme Court of the United States in *Lake Superior & Mississippi Railroad Company vs. United States*; and *Atchison, Topeka & Santa Fe Railroad Company vs. United States* (United States Reports, Supreme Court, Volume 93, p. 442), held that the act of Congress providing that a railway shall be "a public highway for the use of the nation of the United States, free from all toll or other charges, for the transportation of any property or troops of the United States," decrees to the government the free use of the road only and not of the rolling stock or other personal property of the company. Still later—October 2, 1883—it is declared in a Pennsylvania case (*Pierce vs. Commonwealth*, 104 Pa., 150, 155, 13 Am. & Eng. Cas., 74, 79, per Gordon, J.,) citing *Presbyterian Society vs. Auburn & Rochester Railroad Company*, 3 Hill (N. Y.) that

"A railway company is not public, nor does it stand in the place of the public; it is but a private corporation over whose rails the public may travel if it chooses to ride in its cars. Indeed, we regard it as a misnomer to attach even the name 'quasi-public corporation' to a railway company, for it has none of the features of such corporations, if we except its qualified right of eminent domain, and this is because of the right reserved in the public to use its way for travel and transportation. Its officers are not public officers, and its business transactions are as private as those of a banking house. Its road may be called a quasi-public highway, but the company itself is a private corporation and nothing more."

The railways of the United States were regarded as private property subject to the law of the common carrier, and they were so administered as private property. In the sale of transportation they resorted to practices that are still common among those engaged in other branches of commerce. They adjusted rates to market, to competition, to the pressure of shrewd and effective buyers just as the manufacturer or the wholesale merchant still adjusts his prices to markets, to competition, to the pressure of shrewd and effective buyers. The railways gave rebates and cut rates as manufacturers and merchants still give rebates and cut prices. They charged less to and from places where there was effective competition just as manufacturers and merchants still charge less for their goods where there is effective competition than where such competition does not exist.

As producers and distributors strove to extend the area of their markets and competition reduced their margins of profit the railway rate, especially that applied to the coarser and heavier staples of commerce, became more and more a factor in

determining what markets the various producers and distributors could enter. As industry and commerce developed, complaints increased of discrimination made by the railways between persons, between localities, and between commodities. These complaints in various cases were more or less well founded, but the truth is that they arose in the main from that process of adjustment entailed by the extension and ramifications of the channels of trade, an adjustment which is still in process. There was discomfiture because of the loss of large amounts that had been invested in railway construction, and there was bitterness of feeling, frequently justified, against promoters, speculators, and manipulators. The agitation led to the enactment of the Interstate Commerce Act in 1887, the first measure of federal regulation, and which was based on that clause of the constitution authorizing congress to regulate commerce among the states. The intent of that act was simply to apply by federal statute to interstate commerce the principles of the common law which applied in the separate states, and which there applied to both interstate and intrastate commerce; to abolish rebates, secretly cut rates, and other stealthy devices for securing traffic; to prohibit unjust discrimination between persons, places and commodities.

The Interstate Commerce Commission has stated that it could not undertake to equalize the natural disadvantages of shippers and of communities. However, a member of the commission once said that it had been established to protect the people against the railways. Although it is coming more and more to recognize that its duty is that of an arbiter between the shippers and the railways, there is hardly any doubt that the vast majority of the people regard it as an institution created primarily to curb the railways. It is sometimes claimed that the railways are monopolies and as such that their rates should be controlled by a body acting on behalf of the public. That the railways should be prevented by public authority from charging excessive and extortionate rates is not to be denied. To but a partial extent, however, are they a monopoly, and the phase of monopoly seldom enters into the complaints that are brought before the commission. Nearly all of these complaints, especially those of importance, are of rates originally made by the railways and usually under stress of competition, but which do not satisfy all of the shippers.

CONFLICT BETWEEN COMMISSION AND COURTS.

Under the constitution and the law of this land, the ultimate determination of a question involving a property right rests with the courts.

When the Interstate Commerce Commission was established there began the so-called conflict between the commission and the courts. Many of the early decisions of the Interstate Commerce Commission were resisted by the railways and many of these decisions were overruled by the United States Supreme Court. As an advocate of the people it was not unnatural for the commission to fall into errors in the capacity of an arbiter between the people and the railways, even to make mistakes in the law; not because of any lack of ability or honesty on the part of the commission, but because the inability on the part of an advocate to see both sides of the question is a trait of human nature. The railway managers, not without sanction from the courts, as evidenced by the decisions which have been quoted, had a conception of their rights upon which the Interstate Commerce Commission seemed to encroach. Although the railways obeyed 90 per cent. of the formal orders made by the commission, they steadily resisted its encroachments, while the members of the commission, not satisfied with the measure of their authority, as steadily pressed for an increase of power. The commission's zeal in advocacy and the natural human resentment of interference led it to be exceedingly unfriendly to judicial control. The early annual reports of the commission contained numerous criticisms of the courts, even of the supreme court and many of them most severe. This use by the commission of its annual report as an organ of public criticism of the courts has continued

*A lecture delivered under the auspices of the College of Arts and Sciences at Cornell University, May 13, 1912.

to the present although the courts by the nature of their functions are prohibited from making reply to such criticism or engaging in public discussion of the cases that come before them.

Public sentiment, almost invariably against the railways, led to the enactment of the further federal legislation which has given the Interstate Commerce Commission enlarged power over the interstate railways of the country. It has prescribed the system of accounts to be used by the railways, the standard of safety appliances, rules for demurrage, for this, that and the other thing. The railways unquestionably have been forced to do things that they ought to have done of their own volition, but which were not done sometimes for lack of funds, sometimes for lack of foresight, and sometimes because of lack of accord between the administrators of various roads. The drastic features of some enactments would have been avoided had railway managers always exercised the spirit of forbearance and compromise.

In accordance with their importance, cases in the ordinary course of litigation may be appealed from a lower to a higher court, and most cases of federal concern may be appealed ultimately to the Supreme Court of the United States.

The expression "appeal" is used when a case is taken from a lower court to a higher court. The Interstate Commerce Commission is not a court, but none the less its decisions affect the rights of property, and therefore a party thereto cannot be debarred from having such a decision passed upon ultimately by the courts. The constitution provides, however, that except in a few classes of cases of peculiar nature a cause cannot be heard first in the Supreme Court. It must come to it on appeal from a lower court.

As the Interstate Commerce Commission is not a court, the taking of one of its decisions into a court is not designated as an appeal; the case is taken from the commission to the court for "review" by the court. It was originally provided in the interstate commerce law that the decisions of the commission should be subject to review by the United States circuit courts. Appeal would lie from the United States circuit court to the United States Supreme Court.

There have been those who would deny to the courts the right to review the decisions of the commission. Although this right of review was discussed in congress during the debate on the Hepburn bill, it is obvious that it cannot be denied.

It has been enacted that the courts have no jurisdiction to review the wisdom or expediency of the views or action of the commission within the limits of its administrative function. However, the Supreme Court has said:

"Beyond controversy, in determining whether an order of the commission shall be sustained or set aside, we must consider (a) All relevant questions of constitutional power or right; (b) All pertinent questions as to whether the administrative order is within the scope of the delegated authority, under which it purports to have been made; and (c) A proposition which we state independently, although in its essence it may be contained in the previous ones, viz., whether even although the order be in form within the delegated power, nevertheless it must be treated as not embraced therein, because the exertion of authority which is questioned has been manifested in such an unreasonable manner as to cause it in truth to be within the elementary rule that the substance, and not the shadow determines the validity of the exercise of the power."

To expedite the trial of cases brought into the United States circuit court after decision by the Interstate Commerce Commission; in order that such cases might have the consideration of a court that should gain increasing experience with the problems of traffic and in the application of the law as related to them, the congress established the Commerce Court to review cases brought from the Interstate Commerce Commission.

THE COMMISSION AND THE COMMERCE COURT.

As the Commerce Court which has no powers other than those formerly possessed by the United States circuit court, and whose judges rank as did the judges of the United States circuit court, has been made the court in which reviews of the decisions of the Interstate Commerce Commission are concentrated, it follows that the long continued conflict between the Interstate

Commerce Commission and the courts has now become primarily a conflict between the Interstate Commerce Commission and the Commerce Court.

The Commerce Court has probably rendered no greater proportion of decisions adverse to the commission than have the circuit courts or the supreme court if there be taken the entire record from the organization of the commission. It must be borne in mind that ordinarily the orders of the commission are complied with. It is only when the counsel for the railway companies feel satisfied that they can clearly demonstrate error on the part of the commission that they take a case to court. Therefore, it may not be a cause of surprise that in a considerable number of these cases, which involve but a very small proportion of the orders of the commission, the court should find that the commission had committed errors that invalidated its orders. This is only to be expected because of that human fallibility from which members of the interstate commission are not exempt.

The crucial point is whether the court can determine no more than that the decisions of the commission have been or have not been within the statutes which specify its authority and therefore is prohibited from examining the questions of fact on which the commission has based its decisions; or whether the court to ascertain whether the authority of the commission has been manifested in a reasonable manner is entitled to make its own examination of the facts. The decision of the United States Supreme Court upon this point is now being awaited.

Certain differences in the point of view of the Interstate Commerce Commission and that of the Commerce Court may be brought out by a brief survey of a few of the decisions of the commission which have not been sustained by the court.

It is the practice of the railways to build or to permit to be built from their tracks to a large commercial or industrial plant what is known as an industrial track, or sometimes colloquially as a private siding. Over such a track freight cars are moved by the railway to the industrial or commercial plant into whose receptacles their contents are directly unloaded, the time and expense of conveyance from the railway station by dray or truck thereby being saved. In the more densely settled east it has become customary by reason of competition and other causes that in most of the larger cities the railway hauls the cars over the private siding to the plant of the consignee, and takes cars from the plant of the consignee to its own track without charging for this service other than the rate that applies to and from the railway terminal on a shipment over a considerable distance. In the state of California whose population all told is about the same as that of the city of Chicago the railways serving San Francisco and Los Angeles have made a charge of \$2.50 per car for haulage over the private siding between the railway track and the industrial plant. This charge for many years has been a cause of contention. The Interstate Commerce Commission held that such service was part of the terminal service which should be performed by the railways without extra charge and it ruled that they should desist from exacting the charge of \$2.50 per car when such carload freight is moving in interstate commerce incidentally to a system line haul. The railways took the case to the Commerce Court, which held that the railways are bound only to carry freight to the station to which freight may be consigned or from which it may be shipped, that upon the facts presented it comes to a conclusion different from that reached by the commission; that the real question is whether the railway is lawfully entitled to make the charge for the service in question. The court held that "if the carrier is not bound by law to deliver freight at the industrial plant, and it cannot be successfully contended that it is, then it follows as a necessary consequence that this industrial track service is a special service and is not a service which the carrier is bound to perform for the general tariff charge for the transportation of freight destined to Los Angeles."

In another case the Interstate Commerce Commission set aside the rate of \$1.05 per 100 lbs. for the transportation of less-than-carload shipments of boots and shoes from Boston and New

York to Atlanta, Ga., ruling that a rate exceeding 95 cents per 100 lbs. was unreasonable, unjust and unduly discriminatory. The Commerce Court said:

"By the plain language of the law the power of the commission to prescribe a rate for the future cannot be exercised unless after full hearing on complaint made it shall be of the opinion that any of the rates or charges whatsoever demanded, charged, or collected by any common carrier or carriers subject to the provisions of the act . . . are unjust or unreasonable, or unjustly discriminatory, or unduly preferential or prejudicial, or otherwise in violation of the provisions of the act.

"The word 'opinion' must be interpreted with reference to the connection in which it is used in the law. It is only after full hearing upon complaint made that the law gives any weight or significance to the opinion of the commission; that is, it is only when the opinion results from a full hearing that it can be used as the basis of further action by the commission. It is true that in making up the opinion of the commission its members may and it is their duty to call to their aid their knowledge and experience, but if congress had intended that the commission could make up its opinion from the knowledge and experience of its members independent of the evidence in the particular case, then it was idle to provide for a full hearing, as an opinion of the commission could be formed as well without as with the full hearing. A full hearing not only means an opportunity to be heard by the carrier, but an investigation by the commission itself of the lawfulness of the rate in question.

The court holds the allegation that there was no such evidence offered, heard or introduced, to be an allegation of fact; that is that no evidence was offered to the commission to sustain the finding of the commission.

In another case, the commission had ordered a reduction in rates from New Orleans to Mobile, Pensacola and Montgomery. The Commerce Court, referring to a recent decision of the United States Supreme Court in a case of the same general class said, "Tested by the principles laid down in that decision, we are of opinion that the order here drawn in question must be held invalid, as exceeding the delegated powers of the commission, because there was no substantial evidence to sustain it. . . . having regard to the undisputed evidence adduced at the hearing, the existing rates were not shown to be unjust or unreasonable and there was therefore no valid basis for the commission's conclusion."

In another case, in which the commission ordered a reduction in the rates on lemons from California to the east, the court said that the commission dealt "entirely with matters tending to show the need in this industry of a high-protective tariff against Sicily and, not on tariff considerations, but to compensate for the tariff insufficiencies, ordered a low transportation rate especially to eastern territory"; and that as in the judgment of the court "the order is based primarily on the assumed authority to protect their industry against foreign competition, it must be held void as beyond the powers delegated to the commission."

What perhaps is the most important decision of the Interstate Commerce Commission that has been taken up to the Commerce Court is that affecting the rates on transcontinental traffic. The commission divided the country into zones, and specified in percentages the relation that the rates from each zone should bear to the through rate from the Atlantic to the Pacific. That is, it did not prescribe exactly what should be the rates from the respective zones but ordered that they should bear a certain relation to a through rate no matter what that rate might be. The court said, "In so far as the commission attempts thus to determine the relation of the long-and-short haul rates, irrespective of absolute rates, it goes beyond any authority that has been vested in it, for it is not in the power of the commission to say that 100 per cent., 107 per cent., or any given percentage of an unknown less than reasonable rate to the coast is necessarily a maximum reasonable and a non-discriminatory rate."

These decisions are examples of the jurisdiction exercised by the Commerce Court to control the action of the Interstate Commerce Commission when the commission has erroneously taken action adverse to the railways. The Commerce Court has also indicated that it has jurisdiction to control the action of the commission should it erroneously be adverse to the public interest.

PLACE OF THE COMMISSION IN THE GOVERNMENT.

Whatever be the outcome of the controversy over the relation that the Interstate Commerce Commission bears to the courts, it must be recognized that from whatever viewpoint it be considered the commission is, under our scheme of government, an anomalous institution. Under that clause of the constitution which gives the congress the power to regulate commerce between the states, and which was intended to keep one state from taking advantage of another, the congress has been considered to have the power to fix the rates of the railways applying to interstate traffic. The delegation of this power to the commission, while not considered by the courts as a delegation of legislative power, unquestionably is closely related to the legislative power. The power accorded the commission to determine whether an existing rate is reasonable makes it a judicial body. Its mandate to see that the interstate commerce act is enforced makes it an executive body. Therefore the commission does not fit into our scheme of government under which it is ordained that the legislative, executive and judicial functions shall be separate. This is not to say that the commission may not be a useful institution. It has done many useful things and has the opportunity to do more. This is not to say that although an anomaly at present it may not become adjusted to our scheme of government, or that our scheme of government may not become adjusted to include the commission. Indeed, as repeated decisions of the Supreme Court of the United States have recognized the validity of orders issued by the commission, it must be admitted that the constitutionality of the commission has been virtually even if not expressly established. As it stands, it is engrafted upon the government and receives nourishment from the same source that vitalizes the three original co-ordinate departments, to no one of which can it in truth be said to belong. Thus engrafted upon the government, the Interstate Commerce Commission exercises a greater measure of power than any other agency of the government, not only over the railways of the United States, but through its power over railway rates over the entire industry and commerce of the United States.

As we have seen, the popular and legal conception of the relations of the railways to the government has undergone marked changes and, as we all know, there is a possibility of still more radical change. The era of corporate amalgamation marks a transition in the industrial and commercial status which has found effect in modifications of the laws. As the problems developed by this period of transition are not as yet thoroughly understood, the laws to which they have given rise are as yet incoherent.

Inasmuch as the railways of this country have been constructed and maintained by private capital that capital must be protected in the rights inherent in property. To do otherwise would impede their operation, impair their maintenance, and obstruct their development. There is but one way in which the obligation of the government to the railways as private property can be removed, and that is through their purchase by the government. The experience of other countries in the ownership and administration of the railways is sufficient to give the people of the United States a long pause before taking this step.

That private property must be used for public good applies with redoubled force to the railways. This does not mean, however, that their public relations may be considered a basis for their oppression by the public any more than their status as private property can be made the basis for oppression of the public by them.

The project for constructing a railway to the summit of Table mountain, Cape Town, South Africa, is once more being revived. The scheme was opposed by mountain enthusiasts, but the opposition has been largely overcome, and it is stated that plans are under way for its immediate construction.

STATEMENT OF MR. FAY ON SAN ANTONIO BOILER EXPLOSION.

A Searching Analysis of the Evidence, Circumstantial and Other, Brought Out by the Railway Company's Inquiry.

Thornwell Fay, president of the Harriman Lines in Texas and Louisiana, has issued a comprehensive statement regarding the causes of the disastrous boiler explosion at San Antonio, Tex., on March 18, which was described and illustrated in the *Railway Age Gazette* of April 5, page 806. The report of John F. Ensign, chief inspector of locomotive boilers for the Interstate Commerce Commission, was published in our issue of May 17, page 1128. Mr. Fay says:

The officials of the Galveston, Harrisburg & San Antonio have heretofore refrained from making any public statement with respect to the causes of explosion of locomotive 704 at San Antonio, March 18, 1912, awaiting the report to be made by the inspectors of the Interstate Commerce Commission. The report of the commission has now been received, and, in order that the public may know the facts as developed by a board of inquiry composed of disinterested outsiders, and the investigation by the officials, the following statement is made:

The conclusion of the interstate inspectors in giving their report is as follows: "It is our conclusion that this explosion was due to excessive steam pressure, which was caused by an employee of the Galveston, Harrisburg & San Antonio Railway tightening the adjusting screws of the safety valves, resulting in an accumulation of steam pressure beyond the endurance of the boiler."

For several years the Galveston, Harrisburg & San Antonio in every accident of any consequence that has occurred, has selected a board of inquiry composed of operating officers and citizens to investigate and make unbiased reports on such accidents. This practice was followed in this case, and a board consisting of the following gentlemen, most of whom are experts, was convened:

Col. Chas. H. Clark, ordnance department, U. S. Army.
Capt. Geo. A. Schreiner, U. S. Army.
Lieut. R. C. Burleson, U. S. Army, expert on high explosives.
J. H. Holmgreen, president Alamo Iron Works, San Antonio.
G. W. Taylor, superintendent motive power, S. A. & A. P. Ry.
W. B. Tuttle, manager San Antonio Street Railway.
Daniel Cleary, locomotive boiler inspector, S. A. & A. P. Ry.
A. M. Fischer, druggist, San Antonio.
F. McCardle, road foreman of engines, S. A. & A. P. Ry.
T. H. Mooney, former master mechanic G. H. & S. A. Ry.

In addition to this board of inquiry, the explosion was carefully investigated by W. H. Logan, boiler inspector for the Maryland Casualty Company, Baltimore, Md., one of the large insurers of steam boilers, and Capt. Carlton, assistant to Col. B. W. Dunn, chief inspector of the Bureau for the Safe Transportation of Explosives, New York City, and an expert on high explosives.

The expert men on this board of inquiry are fully as competent, both from experience and service, as any of the experts of the Interstate Commerce Commission, and while the interstate inspectors are unanimous and positive in their opinions, this board of disinterested experts were very much divided in their opinions, which were made in writing, as to the cause of this explosion.

Four of the board, two of whom are not experts on steam boilers, think the explosion was due to excessive steam pressure.

One does not give any definite cause of the explosion, but states that the boiler was in most excellent condition; that no evidence of low water was found, and that there was no evidence of anything being wrong with the steam gage.

Two of the boiler experts state the explosion was due to low water, which left part of the crown sheet exposed, and

when cold water was pumped on this metal the explosion took place.

One of the army officers, an expert on high explosives, states, "It is evident that the explosion was caused by some unusual and extraordinary cause." This gentleman found that the mud ring was broken in two parts on the left hand side of the locomotive, and that the bolts in this part of the mud ring showed that wrapper sheet and firebox sheet were separated from the mud ring at the same instant. This was not noted in any other part of the boiler, indicating that a local explosion of some character took place at this point. He states that a close examination of all the parts fails to disclose evidence of high explosive action, but that a small charge of dynamite, if suspended in the water, not in contact with any portion of the boiler coverings, would not have left much, if any, trace of its detonations, and at the same time would be sufficient to cause the damage to the mud ring at the point indicated, and to force the plates from it at this point.

One member, a boiler expert, thinks the steam gage became defective after the pressure reached 190 lbs.

Another member of the board thinks that the fact that the boiler was heated some time before the explosion occurred argues against the application of nitroglycerine or dynamite, but does not preclude the use of some other explosive, such as a derivative of picric acid.

Every member of this board practically agrees, and particularly the boiler experts on the board, that the boiler was of the very best construction, and in good condition, which should absolutely refute the statements made by the Interstate Commerce Commission inspectors, in which they charge the railroad company as being at fault "in keeping a boiler in service for which the factor of safety, as shown by test, was below the recognized standard."

Outside of the reports of this board of inquiry, the report of the boiler inspector for the Maryland Casualty Company says, "I made a thorough investigation of all parts. Internally, all sheets, bracing, heads and seams in first class condition, and the boiler free from mud, dirt and scale. Boiler entirely safe for working pressure of 214 lbs., and would require a pressure of about 956 lbs. to explode it. Examined two pop safety valves (the only ones found after the explosion); found one adjusting screw and lock nut set up tight on casing and threads did not show signs of having been moved recently. As neither pop valve spring was found it was not possible to state at just what pressure the safety pops were set, or how much pressure showed on the boiler at time of explosion, but from evidence gathered do not think there was sufficient steam pressure to have caused all sheets and plates to have been torn asunder as they were. Entertain grave doubts that so complete destruction of this boiler was caused alone by steam pressure."

The inspector of the Bureau for the Safe Transportation of Explosives found: "Appearance indicates boiler probably gave way in the vicinity of its left leg. Mud ring broken into several parts. While did not find any shattered pieces of metal indicating use of high explosives, it was not impossible for one to have been used, either inside or outside the boiler. Plenty of places below boiler near driving wheels where explosives could have been located, which would have driven hole in the boiler, and that part of the boiler may have been the part that was never recovered. There was ample opportunity for persons to have placed an explosive in the boiler. Pressure in the boiler was about 200 lbs., which would give temperature of the steam 388 deg., and probably down at the first end of the leg of the boiler temperature would be not over 360 deg., which is about the exploding point of dynamite or nitroglycerine."

All these experts, both on the board of inquiry and off, practically agree that the boiler was in first class condition, thus refuting absolutely the statement of the Interstate Commerce Commission inspectors, that it was not.

Investigation by myself and other company officials, promptly after the accident, developed the following facts:

The locomotive, which was comparatively new, having been less than four years in service, had been in the San Antonio shops for several weeks and overhauled. After completion of work upon it, the boiler was tested with the usual hydraulic test and found to be in good condition.

This engine after being fired up in the roundhouse was brought out of the roundhouse by Hostler Lewis, a very intelligent negro of many years' experience in this line of work. Lewis stated that he brought the engine out of the roundhouse, took it to the water tank where water was put into the engine tank, and also oil for fuel, and turned the engine over after this was done to the engineer who was to take it out on the run. At the time he turned the locomotive over to the engineer, the steam gage registered 190 lbs., injectors were working, and the engineer tested the water cocks, looked at the steam gage and saw that the injectors were working; then took his oil can and got down on the ground to oil up.

The master mechanic, Mr. McLean, was on the engine 15 or 20 minutes before the explosion, and stated that at that time everything was in good shape, and that the steam gage registered 145 lbs. A man named Gorman was on the boiler at the time the engine exploded setting the pop valves and waiting for the steam to reach 200 lbs., so as to set the valves to blow off at that pressure. The inspectors of the Interstate Commerce Commission state as their final conclusion that the explosion was due to excessive steam pressure, caused by an employee of the company tightening the adjusting screws of the safety valves, resulting in an accumulation of steam pressure beyond the endurance of the boiler; and then go on to state that the company was at fault in allowing such responsible work as setting safety valves to be performed by an employee of whose experience and judgment the testimony shows its officers knew practically nothing.

I am at a loss to know the basis for this statement. Gorman was a victim of the explosion, and, therefore, cannot for himself answer the reflections cast upon him by this report. As a matter of fact, the records of the company show that Gorman was employed early in October, 1911, and his application showed that he had had ten years' experience as a machinist, and had been in the service of several American railways. He had been engaged in this character of work since November, 1911, and had properly and satisfactorily adjusted the safety valves on 27 locomotives prior to the 704, several of which were locomotives of the Missouri, Kansas & Texas. Roundhouse Foreman Cavanaugh, an old and experienced employee of many years in the service, states that when he put Gorman on this work he watched him until he saw that he was O. K.; that his work was satisfactory, and that he was a sober and industrious man.

Mr. McCordle, a member of the board of inquiry, a practical man of wide experience in the handling of men as well as locomotives, in his report which was made shortly after the explosion, referring to Gorman, says, "I think the man who was setting the pop valves was entirely competent; that the work of adjusting the pops was being properly performed."

Gorman began his career as an apprentice in the shops of Robert Thompson & Sons in Great Britain, and served there five years. He was afterwards engineer on British steamers Foyle, Abeokuta and Bessborough, and his ability and conduct are reported "very good" by the commanders of these vessels.

Gorman also worked as a machinist for the Carnegie Steel Company at Youngstown, Ohio, and the foreman of those works states he was a good workman and competent.

As is well known, a great many of the shop employees of

this company voluntarily left its service in September last, and in order to faithfully discharge its duties to the public as well as to its stockholders, it was compelled to employ, and did employ, new men to take their places. If the inference is to be drawn from the report of the Interstate Commerce inspectors that a railway is negligent in entrusting such work as Gorman was performing at the time the accident occurred to anyone other than employees old in its service, then we must plead guilty to such negligence; but I am not prepared to believe that either the government or the general public will censure the railway for employing experienced and competent men wherever they can be found, to take the place of employees who voluntarily quit its service.

The exploded boiler was designed to carry a working pressure of 200 lbs. per square inch, with a safety factor of 5, which means that it would have required a pressure of 1,000 lbs. to the square inch to have made the boiler give way in its weakest part. Mr. Logan, who inspected the boiler thoroughly after the explosion and looked at every piece of it, announced it exceptionally well built, and of the very best material and construction, and states positively that as the boiler stood at the time it exploded, it would have required a steam pressure of about 956 lbs. per square inch to have made it give way. Proof that no such pressure was in the boiler is shown by the fact that at the time of the explosion the injectors were working and putting water into the boiler. The Nathan Manufacturing Company, who made the injectors used, state that these injectors will put water into a boiler at as low a pressure as 40 lbs., and at as high a pressure as 240 lbs.—240 being about the maximum at which injectors of this type would have worked. All engineers and mechanical men are well aware of this fact, and yet it is shown conclusively in the statement of the hostler, and would also no doubt be shown by the engineer if he were alive, that the injectors were working. The engineer, Walter Jordan, was one of the best and most experienced engineers in the service of the company. He had been running an engine for about 25 years, and was always a very careful man. It is entirely beyond the bounds of possibility that if any such pressure as claimed was in this boiler at the time he took charge of the engine he would not have known it and have at once applied the correction.

It is suggested that possibly the steam gage did not record correctly. This gage was tested before it was put on the locomotive by a weight gage testing machine, and was found to be accurate. The man who made the connection to the boiler stated that he cleaned out the syphon pipes and saw that they were perfectly clear before the connection was made. Even admitting that the steam gage might have registered inaccurately, the fact that the injectors were putting water into this boiler at the time of the explosion would seem to prove beyond all doubt that the pressure did not exceed 240 lbs. to the square inch.

One of the most important features in connection with the damage done by this explosion would seem to have been overlooked, at least no mention is made of same by the government inspectors, and that is, that one of the driving axles, a solid piece of steel $9\frac{1}{2}$ in. in diameter, was broken short off underneath this engine by the force of the explosion. It is possible to conceive that a solid steel cylinder $9\frac{1}{2}$ in. in diameter could be confined in such a way that steam pressure sufficient might be brought against it to break it, but it is hardly possible to conceive that steam pressure sufficient to break a cylinder of this kind could be exerted upon it in the open air. The destructive force of a high explosive placed on or near a steel cylinder would, no doubt, shatter it, but it is not believable that any steam pressure in the open air could do this. Many of the employees around the shop at the time of this accident stated positively they heard two separate and distinct explosions. Such testimony as this should be considered.

It is quite apparent from the above that the true cause of

the explosion of this locomotive boiler has not been determined. The inspectors of the Interstate Commerce Commission find unanimously that the explosion was due to excessive steam pressure. The board of inquiry, which was composed of several experts entirely disinterested and fully as experienced and as competent as the Interstate Commerce Commission inspectors, are badly divided in their opinions as to the cause, but all agree that the boiler was in first class shape, contrary to the opinion of the interstate inspectors. While some members of the board of inquiry believe the cause to have been excessive pressure, others equally competent and experienced claim low water the cause, and still other members intimate, at least their belief, that high explosives were used to rend the boiler.

The record of the steam gage, the fact that the injectors were working, the fact that the explosion broke up the boiler and parts of the machinery into many pieces, and threw them in every direction, and the further fact that a massive, solid steel cylinder (the axle) $9\frac{1}{2}$ in. in diameter, was broken like a pipe stem, in the open air, are all circumstances that cannot be lightly brushed aside in any unbiased investigation of this disaster.

Under such circumstances, it is but natural to go further and to consider the circumstantial evidence in this case.

Since the shop employees of the company left its service on September 30, 1911, many acts of vandalism have been committed against its property, and, in addition, two guards and one workman were killed at Houston, while many employees have been assaulted and beaten at many points on the line. Locomotives just out of shop, after running a few miles, have knocked out cylinder heads, and investigation has developed that small nuts or other pieces of metal have been placed in the pipes which worked down into cylinders, doing this damage. Bolts have been placed on guides, which did similar damage. Wooden plugs have been found in steam gage pipes. Innumerable cases have been found where emery dust has been put in bearings; water has been doctored, and many similar acts of vandalism have been perpetrated.

Much evidence exists pointing strongly to the conclusion that this work has been done by men who sought employment in the shops for the very purpose of doing damage to property. It does not require much imagination to believe that some of the men who did such dastardly acts would also, where opportunity offered, apply explosives, such as may have occurred at San Anonio.

Indeed, this view will not be considered extravagant after reading the following quotation from Strike Bulletin No. 100, quoted below:

"Office 608 Hibernia Bldg.,
"San Francisco, January 30, 1912.
"Strike Bulletin No. 100.

"Brothers, Greetings:

"We find the following very able article by Shotwell in today's stock quotations relative to the cause of the big slump in earnings of the Harriman System Lines, and we sincerely hope that the explanation will be satisfactory to the stockholders:

"Earnings of the Harriman Lines for December are expected tomorrow or Wednesday, and they probably will show a material loss compared with the same month in the previous year. In some quarters the Union Pacific's loss is estimated at a million net. This has been an unusually bad winter in the Harriman territory, and the strike has interfered seriously with operation. The strike is practically over, but train movements are interfered with by bars of soap that get into the engine boilers accidentally and emery dust that somehow gets on the axles."

"He forgot to mention the dynamite or sugar that caused so many boiler explosions. *Next.*"

The question is, whether San Antonio was "*Next.*"

The Cordoba Central Buenos Ayres Extension Railway, Argentina, was opened for passenger traffic May 15.

TRAIN ACCIDENTS IN MAY.¹

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of May, 1912:

Collisions.					
Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd. Inj'd.
*14.	Louisv. & N.	Calhoun, Ala.	bc.	F. & F.	2 1
16.	Lake Shore & M. S.	Cleveland.	xc.	F.	1 0
Derailments.					
Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd. Inj'd.
5.	Chicago & Alton	Cockrell, Ill.	unx.	P.	1 0
5.	Southern	Hortense, Ga.	derail.	P.	0 4
*6.	N. Orleans & N. E.	Hattiesburg.	unx.	P.	9 57
7.	Southern	Columbia.	axle.	P.	0 21
7.	Atch., T. & S. F.	Caddoa, Col.	axle.	P.	.. 11
8.	Western & Atl.	Gilmore.	.....	F.	.. ..
12.	Missouri Pac.	New Haven.	d. track.	P.	1 45
12.	Norfolk So.	Hickory.	.....	P.	.. ..
14.	Lake Shore & M. S.	Archbold, O.	eq.	F.	2 1
†15.	Southern	Connelly Spgs.	d. switch.	P.	2 4
20.	Chi., Mil. & St. P.	Winona.	d. track.	P.	0 1
20.	Louisv. & N.	Blue Ridge.	unx.	P.	1 0
20.	Mobile & O.	Coalfire.	unx.	F.	1 1
23.	Penn.	Bradford, O.	.....	P.	1 1
23.	Atlantic C. L.	Tampa.	malice.	P.	0 2
30.	Balt. & Ohio	Philadelphia.	.....	F.	1 4

The trains in collision near Calhoun, Ala., on the 14th, were a freight train and a work train, and the engineman and fireman of the freight were killed. One trainman injured. Both engines and ten cars were knocked off the track and the wreck took fire, and was mostly burnt up. It is said that the work train was on the main track on the time of the freight and that its flagman neglected to flag the freight.

The collision at Cleveland, on the 16th, was due to a string of ten freight cars becoming uncontrollable on a descending grade. These cars ran at high speed for about three miles through the western part of the city and struck a locomotive near the union station. The engineman on this locomotive was fatally injured.

The train derailed near Cockrell, Ill., on the 5th, was an east-bound through passenger. A trespasser, stealing a ride, was killed. The cause of the derailment was not discovered.

The train derailed at Hortense, Ga., on the 5th, was south-bound passenger train No. 13, and the engine, three baggage cars and two passenger cars were overturned. Two employees and two postal clerks were injured. The derailment was at a derailing switch which was carelessly thrown, immediately in front of the train.

In the derailment near Hattiesburg, Miss., on the 6th, 7 passengers and 2 trainmen were killed and 57 passengers were injured. The engine and first five cars were derailed, the engine and baggage car being overturned. The train was running on a straight line at about 30 miles an hour. The cause has not been determined.

The train derailed at Columbia, S. C., on the 7th, was south-bound express No. 31, and two sleeping cars were overturned. Seven employees, 24 passengers and 3 other persons were injured. The derailment was due to the breaking of an axle of a driving wheel.

The train derailed at Caddoa, Colo., on the 7th, ran some distance on the ties and roadbed after the wheels jumped the track, and 3 of the 4 passenger cars were partly overturned. Only 11 persons (passengers) were injured, and those not

¹Abbreviations and marks used in Accident List:

rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc. obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P. or Pass., Passenger train—F. or Ft., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

seriously. The derailment was due to the breaking of the crank axle of the engine.

The train derailed at Gilmore, Ga., on the 8th, about 7 p. m., was a wrecking train returning from a wreck some distance north of Gilmore, and three of the cars were overturned. One trainman and one car repairer were killed and 9 others were injured.

The train derailed on the Missouri Pacific, near New Haven, Mo., on the 12th, was westbound passenger No. 1, and the engine and first two cars were overturned. Three passenger cars were ditched but fell against a bluff and were not overturned. The engineman was killed, and 5 employees, 4 mail clerks and 36 passengers were injured, all but three of the passengers' injuries being classed as slight. The derailment was due to heavy rain and "soft" track, some repair work done the previous day having been imperfectly finished.

The train derailed at Hickory, Va., on the 12th, was northbound passenger No. 2, and the first car to leave the track was the mail car. The three rear passenger cars were overturned. Eighteen passengers and one trainman were injured.

The derailment on the 14th, near Archbold, Ohio, was caused by a drawbar which fell on the track, following the parting of the train, because of a coupler coming open. The car next behind the one that failed was an empty stock car and, in consequence of the sudden stopping of the cars by the automatic application of the air brakes, this car was crushed by loaded cars behind it; and six cars, altogether, were wrecked. Two trespassers were killed and a third was injured.

The train derailed at Connelly Springs, N. C., on the 15th, was southbound passenger No. 11, and the engine and first two cars fell against a train standing on a side track, causing fatal injury to the engineman of the standing train. One passenger in No. 11 was killed, and two trainmen and two passengers were injured. The derailment was caused by the loosening of a switch, due to a bolt working out.

The train derailed near Winona, Minn., on the 20th, was the first section of the westbound Pioneer Limited, and the baggage car, one smoking car and two sleeping cars fell down a bank, lodging partly in the Mississippi river. The train was running slowly, having been warned of the possibility of wash-outs, and the track had been examined a few minutes previous to the passage of the train. The bank slid out after the engine had passed the spot, the surface of the roadbed appearing to the engineman to be in perfect condition. Only one person, a passenger, was seriously injured.

The train derailed near Blue Ridge, Ga., on the 20th, was northbound passenger No. 4, and the engineman was killed. The cause of the derailment could not be determined.

The derailment near Coalfire, Ala., on the 20th, was that of a light engine running backward. Both tender and engine fell down a bank and a student fireman was killed. The regular fireman was seriously scalded.

The train derailed near Bradford, Ohio, at 4 o'clock on the morning of the 23rd, was westbound passenger No. 25. It was running about 50 miles an hour, and the entire train, except the last two cars, was derailed. The fireman was killed and a mail clerk was injured. It is said that no passengers were seriously hurt. The cause of the derailment has not been determined.

The train derailed at Tampa, Fla., on the 23rd, was southbound passenger No. 83, and the engine and tender were overturned in the ditch. An express messenger and the fireman were slightly injured. The derailment was due to a partly open switch, opened maliciously or by a crazy person.

The train derailed at Philadelphia, on the 30th, was a southbound freight, and the cause of the derailment was sand which had been washed on to the tracks at a road crossing, in a heavy rain. The engine was overturned, and the conductor was crushed beneath it and killed; the engineman and three other trainmen were badly injured.

Electric Accidents.—Of the eight electric accidents to electric

cars reported as occurring in the United States in the month of May, one, a collision near Kokomo, Ind., on the 10th, is reported as having resulted fatally; one person killed, 34 injured. The collision was between a car of the Indiana Union Traction Company and one of the Fort Wayne and Wabash Valley. Both cars were badly wrecked, but most of the passengers were in the rear ends of the cars.

SUPREME COURT DECISIONS IN COMMERCE COURT CASES.

As reported in last week's issue of the *Railway Age Gazette*, the Supreme Court of the United States on June 7 handed down three decisions overruling the Commerce Court in cases that had come up from the Interstate Commerce Commission. Two cases were remanded with directions to dismiss for want of jurisdiction; in the third it was held that the Commerce Court possessed jurisdiction but its decision was reversed. On June 10 the Supreme Court also rendered another decision in a case instituted by the Federal Sugar Refining Company, involving lighterage charges in the New York harbor, in which a preliminary injunction issued by the Commerce Court was affirmed and the case was remanded for hearing on the merits. In the Procter & Gamble case the decision turned on the extent of the Commerce Court's jurisdiction. Chief Justice White delivered the opinion of the court, of which an abstract follows:

The Procter & Gamble Company, dissatisfied with the regulations concerning demurrage, in so far as they imposed in certain respects charges upon its tank cars, filed a complaint with the Interstate Commerce Commission charging the rules to be repugnant to the act to regulate commerce because unjust and oppressive and because to enforce them would create preferences and discriminations forbidden by the act. After hearing, the commission made a report declaring that the rules complained of were in no sense in conflict with the act to regulate commerce, and on the contrary conformed to that act and tended to prevent and repress unlawful preferences and discriminations. An award of relief was therefore denied. In February, 1911, the Procter & Gamble Company filed a petition in the Commerce Court of the United States making defendants the United States, the Interstate Commerce Commission and the railways who had been complained of in the proceeding before the commission. In disposing of the case, the court considered it in a two-fold aspect—first, as to its jurisdiction; and, second, as to the merits of the case. On the first subject it held, *a*, that it had jurisdiction of the cause, and that the refusal of the Interstate Commerce Commission to afford relief to the Procter & Gamble Company was, for the purposes of jurisdiction of the court, the exact equivalent of an order of the commission granting affirmative relief, and *b*, as a corollary of this power it was further decided that there was jurisdiction to award pecuniary relief for demurrage if any was illegally exacted. On the merits, however, it was decided that the Interstate Commerce Commission had rightfully refused to grant relief and that there was no foundation for the contention that the property of the company in its private tank cars was taken without due process of law by the demurrage regulations. On this subject it was declared that as the company had accepted the provisions of the published tariffs concerning the use of the tank cars, therefore those cars were submitted to the regulations which the carriers had lawfully established.

The case was then brought here by the appeal of the Procter & Gamble Company. That company insists that the court below erred in not awarding the relief which was asked and in dismissing the petition. On the other hand the Interstate Commerce Commission and the railways insist that the court was right in refusing relief and dismissing the bill. Before we can come, if at all, to consider the merits, however, it is necessary to dispose of the question concerning the jurisdiction of the court below to entertain the petition, because the United States insists at bar, as it did in the lower court, that the court erred in overruling

the demurrer to the jurisdiction and refusing to dismiss the cause for want of jurisdiction.

The question to be decided is this: Does the authority with which the Commerce Court is clothed in virtue of these provisions invest that body with jurisdiction to redress complaints based exclusively upon the conception that the Interstate Commerce Commission, in a matter submitted to its judgment and within its competency to consider, has mistakenly refused, upon the ground that no right to the relief claimed was given by the act to regulate commerce, to award the relief which was claimed at its hands? In other words, the important question is, Is the authority of the Commerce Court confined to enforcing or restraining, as the case may require, affirmative orders of the commission, or has it the power to exert its own judgment by originally interpreting the administrative features of the act to regulate commerce and upon that assumption treat a refusal of the commission to grant relief as an affirmative order and accordingly pass on its correctness?

Turning for the elucidation of the question to the jurisdictional provisions (of the act creating the Commerce Court), the solution of the question must intrinsically be found in a correct interpretation of the second subdivision. The words of this second subdivision are: "Second. Cases brought to enjoin, set aside, annul, or suspend in whole or in part any order of the Interstate Commerce Commission."

Giving to these words their natural significance we think it follows that they confer jurisdiction only to entertain complaints as to affirmative orders of the commission; that is, they give the court the right to take cognizance when properly made of complaints concerning the legality of orders rendered by the commission and confer power to relief parties in whole or in part from the duty of obedience to orders which are found to be illegal. No resort to exposition can add to the cogency with which the conclusion stated is compelled by the plain meaning of the words themselves. But if it be conceded for the sake of argument that the language of the provision is ambiguous a consideration of the context of the act will at once clarify the subject. Thus, the first subdivision provides for the enforcement of orders, that is, the compelling of the doing or abstaining from doing of acts embraced by a previous affirmative command of the commission, and the second (the one with which we are concerned) dealing with the same subject from a reverse point of view, provides for the contingency of a complaint made to the court by one seeking to prevent the enforcement of orders of the commission such as are contemplated by the first paragraph. In other words, by the co-operation of the two paragraphs, authority is given on the one hand, to enforce compliance with the orders of the commission if lawful, and, on the other hand, power is conferred to stay the enforcement of an illegal order. The other provisions of the act are equally convincing.

We might well be content to rest our conclusion upon the considerations just stated. In view, however, of the importance of the subject we do not do so, but shall consider the matter in a broader aspect for the purpose of demonstrating that to give to the statute a meaning contrary to that which we have found results from its text, and therefore to recognize the existence in the court below of the power which it deemed it possessed would result in frustrating the legislative public policy which led to the adoption of the act to regulate commerce, would render impossible a resort to the remedies which the statute was enacted to afford, would multiply the evils which the act to regulate commerce was adopted to prevent, and thus bring about disaster by creating confusion and conflict where clearness and unity of action was contemplated. It cannot be disputed that the act creating the Commerce Court was intended to be but a part of the existing system for the regulation of interstate commerce. That in adopting the provision concerning the Commerce Court and making it part of the system, it was not intended to destroy the existing machinery or method of regulation, but to cause it to be more efficient by affording a more harmonious means for securing the judicial enforcement of the act to regulate commerce

is certain. The first six sections, which called into being the Commerce Court and defined its powers, all demonstrate the purpose as above stated, that is, to adjust the powers and duties of the newly created court in such manner as to cause them to accord with the system of regulation provided by the act to regulate commerce as it then existed.

By that act as originally enacted many regulations and consequent duties were imposed upon carriers in the interest of the public and of shippers which did not theretofore exist, and various administrative safeguards were formulated, all of which, in their very essence, required, first, for their compulsory enforcement the exercise of official functions of an administrative nature, and, second, for their harmonious development an official unity of action which could only be brought about by a single administrative initiative and primary control. To that end the act (sec. 11) created an administrative body endowed with what may be in some respects qualified as *quasi* judicial attributes, to whom was confided the enforcement of those provisions of the act which essentially exacted unity in order that they might beneficially operate. The statute, therefore, necessarily, while it created new rights in favor of shippers, in order to make those rights fruitful as to the subjects with which the statute dealt coming within the scope of the administrative unity which we have mentioned primarily made the judgment of the administrative body to whom the statute confided the enforcement of the act in the respects stated a prerequisite to a resort to the courts.

In the long interval which intervened between 1887 when the act to regulate commerce was enacted and June 18, 1910, when the Commerce Court act was passed we have learned of no instance where it was held or even seriously asserted, that as to subjects which in their nature were administrative and within the competency of the commission to decide, there was power in a court, by an exercise of original action, to enforce its conceptions as to the meaning of the act to regulate commerce by dealing directly with the subject irrespective of any prior affirmative command or action by the Interstate Commerce Commission. On the contrary, by a long line of decisions, it appears by the reasoning indulged in that it was never considered that there was power in the courts as an original question without previous affirmative action by the commission to deal with what might be termed in a broad sense the administrative features of the act to regulate commerce by determining as an original question that there had been a compliance or non-compliance with the provisions of the act.

Originally the duty of the courts to determine whether an order of the commission should or not be enforced carried with it the obligation to consider both the facts and the law. But it had come to pass prior to the passage of the act creating the Commerce Court that in considering the subject of orders of the commission, for the purpose of enforcing or restraining their enforcement, the courts were confined by statutory operation to determining whether there had been violations of the constitution, a want of conformity to statutory authority, or of ascertaining whether power had been so arbitrarily exercised as virtually to transcend the authority conferred although it may be not technically doing so.

In view of the provisions of the act to regulate commerce just referred to as originally enacted, of the legislative evolution of that act, its uniform practical enforcement and the constant judicial interpretation which we have thus briefly indicated, it is impossible, we think, in reason, to give to the act creating the Commerce Court the meaning affixed to it by the court below, since to do so would be virtually to overthrow the entire system which had arisen from the adoption and enforcement of the act to regulate commerce. First, because as the previous ascertainment by the commission on complaint made to it as to whether violations of the act had been committed, with reference to the subjects as to which previous action was required, was an essential prerequisite to a right to complain in a court, the interpretation given below would, by destroying the necessity for the prerequisite, action of the commission, operate to create a vast

body of rights which had no existence at the time the Commerce Court act was passed. Second, because the recognition of a right in a court to assert the power now claimed would of necessity amount to a substitution of the court for the commission or at all events would be to create a divided authority on a matter where from the beginning primary singleness of action and unity was deemed to be imperative. Third, because the result of the interpretation would be to bring about the contradiction and the confusion which it had been the inflexible purpose of the lawmaker from the beginning to guard against, an interpretation which would seemingly create rights hitherto non-existent and yet at once proceed to destroy such rights by bringing about a conclusion which would render the rights which the act creates practically valueless. Indeed, these inevitable results of the interpretation given by the court below to the act would necessarily amount to declaring that Congress in seeking to unify and perfect the administrative machinery of the act to regulate commerce and to make more beneficial its operation had overthrown the whole fabric of the system as previously existing.

The demonstration of the error of the construction adopted below is so additionally made manifest by a consideration of the general structure and the text of the act creating the Commerce Court, that we advert to that point of view: A. The first section of the act makes clear that the purpose was not to create a court with new and strange powers but only to give to the new court the special jurisdiction then possessed by the courts of the United States for the enforcement of orders made by the commission, and thus to unify the exertion of judicial power with reference to the enforcement of the orders of the commission. The opening words of the section which make this result clear are as follows: It (the Commerce Court) shall "have the jurisdiction now possessed by circuit courts of the United States and the judges thereof over all cases of the following kinds: . . ." B. Because the enumeration as to the subject matters of jurisdiction conferred which follows the words just quoted, conforms to the existing law and evidently assumes its continued operation. C. Because the sedulous effort of Congress while creating the new machinery not to destroy the existing system finds expression in a two-fold way: (1) by the declaration that nothing in the fact that the existing power of the circuit courts as to the subjects of jurisdiction transferred to the new court should be deemed as an enlarging of those powers, and (2) by the provision that nothing in the transfer of the enumerated powers to the Commerce Court should be considered as limiting or abridging the existing jurisdiction possessed by the circuit courts as to things and subject matters not embraced in the powers transferred. D. Because the act which created the court contained in its latter sections provisions amending sections of the act to regulate commerce which when rightly interpreted were manifestly adopted to make that act more consistent with the new situation resulting from the creation of the new court and utterly inconsistent with the conception that that court had power not previously possessed by any court and the existence of which would serve to set at naught the whole system of interstate commerce regulation.

The general considerations which we have stated establish the error committed by the court below in holding that it had jurisdiction over the claim of the Procter & Gamble Company to recover on a money demand based on the illegality of the demurrage charges alleged to have been wrongfully exacted by the railway companies. Through abundance of precaution, we, however, say that wholly irrespective of the general considerations stated we think the conclusion of the court as to its possession of jurisdiction over the subject referred to was clearly repugnant in other respects to the express terms of the act.

As it follows from what we have said that the court below erred in taking jurisdiction of the petition, it results that our duty is to remand the cause to the court below with directions to dismiss the petition for want of jurisdiction.

* * *

In the case known as the Southeastern Rate Case, which had been appealed by the Cincinnati Receivers' & Shippers' Associa-

tion and the Eagle White Lead Company from a decision of the Interstate Commerce Commission, Chief Justice White also delivered the opinion, which followed that in the Procter & Gamble case.

The appellants in these cases originally applied to the Interstate Commerce Commission for reduction of the maximum rates between Cincinnati and Chattanooga from the 76c. schedule to 60c. schedule. The commission refused to make the full extent of this reduction. Thereupon the respective parties filed bills in the Commerce Court demanding that the commission's order be "suspended, set aside, annulled, and declared void and of no effect," and that the individual defendants and the commission be required by mandatory injunction to set aside and annul the said order, that the case be reopened, and the complainants given further relief. The two bills were consolidated. The individual defendants, the commission, and the railway company all demurred to the bill on the merits. The United States moved to dismiss on the ground that the court had no jurisdiction. The court took jurisdiction, but dismissed on the merits. These appeals were then prosecuted. The cases are, in all respects, controlled by the opinion announced and ruling made in the Procter & Gamble case, this day decided, and for the reasons in that case stated, these cases must be and are remanded, with directions to dismiss for want of jurisdiction.

The third case is that of the Interstate Commerce Commission and the United States versus the Baltimore & Ohio, the Pennsylvania and other roads, known as the "restricted rate case."

The question in the case is whether railway companies may charge a different rate for the transportation of coal to a given point to railways than to other shippers, the coal being intended for the use of the railways as fuel.

The Interstate Commerce Commission held that a charge of a different rate was an unlawful discrimination against other shippers and made an order requiring a cessation of such charge. The execution of the order was enjoined by the Commerce Court.

The facts are certainly undisputed, or, to put it differently, the circumstances and conditions which determined the order are certainly not in controversy; and while certain general inferences are disputed which may be called inferences of fact, yet we think "power to make the order, and not the mere expediency of having made it, is the question" presented. In other words, that the question presented by the petition is that the order of the commission was not merely administrative, but proceeded from a construction of sections 2 and 3 as applicable to the conditions which affected the traffic in the different kinds of coal and that the different charges for transportation constituted violations of those sections. The Commerce Court, therefore, had jurisdiction of the petition and jurisdiction to enjoin the order of the commission if the court considered that the order would cause irreparable injury.

It is asserted that there are disparities between the traffics and qualifying circumstances which the commission disregarded and, in error, held that traffic in fuel coal could not be distinguished from the traffic in commercial coal.

The commission, it is contended, while it found a similarity in the traffics, did not consider or discuss the two most important features of difference—"the two features" which make the traffics unlike, that is, that railway-fuel coal "does not come into competition with the commercial coal, and is in competition with coals coming on the railway's line at other points." But such features do not affect the carriage, qualify or alter the essential service, which is to get an article from one place to another. The greater or less inducement to seek the service is not the service. Such competition, therefore, is as extraneous to the transportation as the instances in the cases cited. And equally so in the other "feature" that the fuel coal may be destined for consumption beyond the junction point. The circumstances do not alter the fact that it and commercial coal go to the same point, and are delivered at the same point. There is, it is true, a difference in the manner of delivery, depending

upon the difference in the facilities possessed by the railways and other consignees.

The commission especially disclaimed holding that the rate to the junction point must be paid on shipments going beyond that point, and insisted that it only held that the charges to that point should be the same to all shippers, and rates through that point should also be the same to all shippers. And the commission said that the testimony established that the service as to the coals was alike when they go beyond the junction point. The commission, therefore, considered alone the service, disregarding circumstances and conditions which were mere accidents of it and had relation only to the respective shippers.

There are other contentions or rather phases of those that we have considered and which seek to further emphasize the strength of competition as a circumstance or condition differentiating the traffic. For instance, it is urged that the shipment of the fuel coal to a particular railway "for the use of that railway" makes special the traffic. And, further, that "a railway is not a person" but is "rather in the nature of a geographical division and extends through long distances." Pushing the argument or illustrations farther, it is urged that a railway company may be distinguished from the physical thing, the railway itself, and may be a locality where a commodity is used, like "a river, a county or a city," and be entitled to preferential rates to accommodate competitive conditions. The *Import Rate Case*, 162 U. S., 197, is invoked as analogous. We cannot accept the likeness nor the distinctions which are said to establish it. The railway company cannot be put out of view as a favored shipper, and we see many differences between such a shipper receiving coal for use in its locomotives and a nation as the destination of goods from other nations for distribution throughout its expanse on through rates from points of origin.

The decree of the Commerce Court is reversed and the case remanded with directions to dismiss the petition.

The Federal Sugar Refining Company case is a suit instituted in the Commerce Court to enjoin the enforcement of an order by the Interstate Commerce Commission. The order which it was the purpose of the suit to enjoin was made in a proceeding commenced before the commission on behalf of the Federal Sugar Refining Company, to compel the railways to desist and abstain from paying to Arbuckle Brothers, claimed to be operating what is known as the Jay street terminal, certain so-called allowances for floatage, lightering and terminal services rendered by them to the complainants in connection with sugar transported by them in New York harbor to and for the complainants, while at the same time paying no such allowances to the said Federal Refining Company on its sugar.

There was clearly a right in the court below to entertain jurisdiction of the petition and to determine whether the affirmative order of the commission was entitled to be enforced. There was clearly also power in the court to allow a preliminary injunction, since that authority is conferred in express terms by section 3 (208) of the act. And the right to appeal from such an order is also in express terms conferred by section 2 of the act.

It is not disputable that although the right to appeal to this court from an order like the one here in question is conferred, yet obviously the purpose which must have caused the creation of the Commerce Court must have been the desire to interpose between the action of the commission and this court an intermediate tribunal, having the powers which the statute delegates to it. Our duty is to give that purpose effect and to uphold the lawful authority of the court, without deviation and yet without hesitancy where there has been an abuse of discretion to correct it in the completest way. But as this case manifests no such abuse, our duty is not to reverse the action of the court but to remand the case so that there may be an opportunity to dispose of it on the merits in the forum selected by Congress for that purpose. Of course, in saying this, we must not be understood as deciding or in any way implying that the duty

would not exist to examine the merits of a preliminary order of the general character of the one before us in a case where it plainly in our judgment appeared that the granting of the preliminary order was in effect a decision by the court of the whole controversy on the merits or where it was demonstrable that grave detriment to the public interest would result from not considering and finally disposing of the controversy without remanding to enable the court below to do so.

REPORT ON HOOSAC TUNNEL COLLISION.

An abstract of the report of the Massachusetts Railway Commission on the rear collision which occurred in the Hoosac tunnel, of the Boston & Maine, last February, was given in the *Railway Age Gazette* of June 7. The following additional facts are brought out in the report of Professor William L. Puffer, who made an examination of the electrical conditions at the tunnel.*

The power house is 2.4 miles from the west portal of the tunnel, and a 25-cycle, single-phase current at 11,000 volts is transmitted to the tunnel over a wire line on poles. The current is distributed to separate sections of the over-head trolley wire by six feeders. Each trolley wire in the tunnel is made of three separate wires fastened together at 10 ft. intervals. The insulators, 100 ft. apart, are suitable for 300,000 volts. The return current from the motors passes over the rails to the west portal, where it is collected by a special return wire.

In the event of an accidental or abnormal increase in the current sent out from the generator, an automatic device immediately switches a large resistance into the circuit and limits the rise of current, and if this excess is of more than momentary duration, another switch disconnects the generators from the wires and leaves everything dead. On the switchboard of the power house is an automatic instrument which draws a line on a continuously moving wide paper ribbon indicating the momentary fluctuations of the total demand for power of the various electric locomotives. The fluctuation of this line records the moment of starting of every motor and the cutting off of power, and from it can be made a very fair study of the movements of individual motors or engineers.

Professor Puffer made tests showing that there was room for the engineman to put his head out of the cab window. Throughout the tunnel there was at least 4½ in. space from the side of the cab of the steam engine that was in the collision, and at the place where the engineman says he looked forward and saw the signal there was a space of 18 in. He had to project his head not over 2 in. in order to see the signals in the manner described. It is possible, however, that he may have seen the signal lights some distance ahead, while at the same time the men looking out of the front windows of the motor car (at a different angle) may have been unable to see the lights on account of smoke, and that their first view was of the "double green." Attention is called to the possibility that a red and a yellow may change to green at the same time not only on the closing of a switch in the block section, but also when a signal is put in order after having been out of order because of a broken wire or other defect.

Professor Puffer's search for conditions which would make possible a false clear signal was "long, difficult and discouraging." The signals seemed able to meet every line of attack by showing a stop signal at the slightest attempt to tamper with them.

The signal current in the rails is alternating, 60-cycle. The energy for the signal circuits is taken from an electric light company, over special wires and special transformers. Accidental injury to the signal circuits from either high potential

*The plan of the wiring for the signals in the tunnel is the same as that described in the report presented by Committee No. 10 to the Railway Signal Association last October (*Proceedings*, Vol. 8, pages 415, 424 and inset following 424).

currents or lightning is prevented by several sets of arresters and unusually elaborate double transformation.

The rails in the tunnel are 45 ft. long, laid with even joints. Each block section is divided into two track circuits, and each track circuit is fed, in the middle of its length, at a pressure not exceeding 30 volts. There are three kinds of relays; the most important one is called the galvanometer relay. One of its two electrical windings is permanently supplied with current from the transformer near it; the other receives current from another source over the signal (wire) circuit from the transformer at the beginning of the next block to the east. According to whether this latter current flows one way called "normal," or the other way called "reversed," or does not flow at all, the moving part of this relay rocks (revolves) to the one side or the other, or remains in the middle position.

The rocking element carries four sets of contact points so arranged that when in the middle position, current is cut out of two simple relays; these being open, one turns on a red light and the other a yellow light, as their armatures fall against the back stops.

When rocked in a normal direction by the normal current in the signal line, contacts are closed and current is sent through both light relays, attracting their armatures and thereby turning on two green lights.

When the current in the signal line is reversed, the galvanometer relay rocks in the opposite direction, sending current to the first relay, thereby turning on a green light, but sending no current to the other relay, which maintains a yellow light, because its armature is down.

The galvanometer relay has other contact points controlling a pole changing relay, through whose contacts a current derived from the near signal transformer is delivered in the normal direction to a set of signal wires going to the next signal in the rear. The pole changing relay reverses the current only at such times as it is not supplied with current from the contacts of the galvanometer relay; this occurs when there is no current in the moving element, and it is in the central position; and the lights show red and yellow.

There is a track relay at each end of each track circuit. As each block is a "cut section" the wire circuit controlling the signal extending the length of the block must be closed at four points in order to clear the signal. With any one of the four track relays demagnetized, the galvanometer relay on the signal wire rests in a neutral position. A current of one polarity passing through it holds the home signal at clear and one of the opposite polarity holds both home and distant clear.

Professor Puffer experimented with trains and engines to see if the propulsion currents could interfere with the signals. Describing these trials he says:

I find from a study of the automatic record at the power house upon which each engineer has unknowingly written more or less clearly his movements just previous to the accident, and from the train sheets of the day, that there were four motors in use. No. 5002 had just brought a freight train out of the west end of the tunnel and was using no power at the moment, but had been using a little at the yard; No. 5003 was drifting out light at the west end under no power; No. 5001 was on the eastbound freight and was slowing down just outside of the east end of the tunnel, and was using little, if any, power, but had been using power to accelerate its train and get out of the tunnel; No. 5004 was drawing the passenger train and probably coasting with no power on, but I am certain was not using power for three-quarters of a minute before the accident, during which time it would have gone 1,320 ft. if traveling at 20 miles per hour.

If any 25-cycle propulsion current did affect the signal H 1376, it must have come from the motor of the eastbound freight train; and with this in mind, I placed some cars at about the place where the freight must have been, and had a motor with brakes set run back and forth over the impedance bonds at the

east end of the tunnel. Simultaneously an engine was caused to stop with its front wheels part of the time on the one side, and part of the time on the other side of the track insulation at the setting point. I stood on the track watching the lights of the signal and saw that it operated perfectly with no hesitation and indicated clearly the progress of the motor through the tunnel and into the yard, giving the double green as the track was cleared, and then the green yellow and red yellow as the motor backed the cars into the tunnel and went to seeing-sawing over the insulation at the end of the block. Nothing abnormal happened and the signal went through the proper changes as the cars were removed and the motor came back to get my engine.

Professor Puffer also tested the track relays to make sure that they did not respond to the propulsion current of 25 cycles. "The design is extremely ingenious and contains so many precautions against a false clear signal that it seems almost impossible that such a thing could occur." Yet relays have been known to stick and refuse to move. The provision of two relays in each section is claimed to guard against danger from such a failure.

The inspector, or his assistant, visits every signal and relay in the electric zone once a week, at least.

Professor Puffer found that very small whiffs of smoke emitted by steam locomotives and subsequently whirled about by trains would completely or partially obscure the signal lights. Such whiffs were seen to obscure one of two lights at the same signal, but not the other. The tail lights of a receding train were noticed to disappear in a very few seconds.

Concerning possible derangement of signals, the reports says:

I have found two theoretical abnormal conditions which will explain the showing of two green lights when a train is in the block provided certain unlikely, yet possible derangements were to happen. I have found no evidence of such a condition, nor has it been artificially produced.

First Condition.—Assume the rear of the freight train somewhat east of the track transformer of the first track circuit section east of H 1376. Assume the passenger train approaching the signal H 1376 at any point. Assume that through some fault, derangement, or leakage of current the signal line as it approaches the track relay at the beginning of the block receives a suitable amount of current in the normal direction from any of the many wires connected to the transformer at this point. Assume that this leakage is in the normal direction and sufficient in quantity to hold the galvanometer relay in the position corresponding to double green. The freight train will short circuit the track transformer, thus opening the contacts of the first relay in the block, causing the signal to show red-yellow. As the rear of the freight passes on, sufficient current from the track transformer will again pass through this track relay, closing its contacts and allowing the leakage current to change the galvanometer relay into its position to show a double green. When the motor of the passenger train passes the setting point and into the block, it will open the track relay and by cutting off this leakage current, cause the signal to show red-yellow. The above explanation would produce conditions which tally exactly with those stated by the steam engineer, and would require a train in a position in which the freight train could well have been. Such an accidental condition of affairs would probably never be reported as the lights operate properly under the conditions produced by trains in exactly these positions, and even then the signals would only stop a train. However, it must be said that had an observer been standing and watching H 1376 as single trains went by, he would have noticed that the combination of green-yellow might never be seen as the reversed current might not be strong enough to overpower the leakage current.

Second Condition.—Assume that the rear of the freight train was about to pass over the impedance bond in the middle of the block (at the cut section), and that the track relay on the

east of this insulation was either out of adjustment or that its contact points were sufficiently burned or roughened as to never interrupt the circuit through them under any position the relay might take. With the freight train here, the relay west of the insulation at this point would interrupt the signal circuit, causing H 1376 to show a red and a yellow. Instantly upon the passage of rear wheels beyond the impedance bond the signal line would be completed, and the signals would change to double green, and so remain until the forward wheels of the motor of the passenger train passed into the block, or the movement of the freight took the current from the track transformer. This combination produces the effect as described by the steam engineman, and assumes that a freight train about 1,500 ft. long would not immediately take sufficient current from the track transformer of the eastern section of this block to cause the track relay at its eastern end to lose its magnetization and open the signal circuit.

In conclusion, the report says: . . . The complete electrical installation shows the highest degree of skill available, and there has been no use of any but the best of materials and apparatus.

An examination of the interior of the tunnel from end to end with the aid of a powerful search light to note the methods used in the installation of trolley wires, cables and signals, shows that the construction is first class in every way and very creditable to those who worked under such adverse conditions.

The automatic, electric signals of the electrified zone are as reliable and trustworthy as any which are available, but signal H 1376 could have changed and may have changed from red-yellow to double-green due to a combination of events, which, while improbable, is not impossible. . . .

The high voltage propulsion power was immediately automatically cut off at the power house when the trolley wires were either jammed against the wall of the tunnel or against the iron parts of either the electric motor or the locomotive. This contact was so complete that almost no flash or light was produced by it in the tunnel, and the two subsequent tests with power made no light and could not have started the fire because of the completeness of the short circuit.

Neither the electrification of the Hoosac tunnel nor the use of the rails for returning the propulsion current to the power house is in any way responsible for the accident, for the fire following the accident, or for the failure of any signal to indicate danger.

I am of the opinion that the enginemen of the electric motor No. 5004 may not have seen the red-yellow lights before the double green of signal H 1376, nor the tail lights of the freight train as they approached it, because of the smoke made by the westbound and the eastbound freights; and at the moment of the collision they were coasting and looking for the telltale signal at the 1,000 ft. mark.

The country between Port San Antonio, Argentina, and Valdivia, Chili, has been surveyed, and a favorable report has been made on the proposal to build a transandine railway connecting these ports. The railway under construction from San Antonio to Nahuel Huapi would be used for about 300 miles of that section; 200 miles have already been completed. The line would then run for about 60 miles up the valley, where the mountains are much lower than they are in the section further north.

The Caledonian Railway, Scotland, awards annually a prize of ten dollars for the best essay on a stated ambulance subject sent in by any employee of the company. This year the essay was "Unconsciousness, Its Principal Causes and Treatment," and in all 26 papers were submitted. The prize was awarded to William Tavendale, ticket collector, Perth. Mr. Tavendale has won this prize on two previous occasions, 1905 and 1906.

RAILWAY SIGNAL ASSOCIATION.

On the second day of the New York meeting, which was in session as we went to press last week, C. J. Kelloway, signal engineer of the Atlantic Coast Lines, presented on behalf of Committee No. 2, Mechanical Interlocking, seven drawings of interlocking station leadouts, which were approved after a short discussion.

Following this the discussion of the rules submitted by Committee No. 5 was completed. It was moved that the proposed changes in rules 334 and 365, concerning manual block, and 434 and 465, concerning controlled manual block, are unnecessary. Several revisions were made in the proposed rules 629, 630, 631 and 667, included under the operation of interlocking plants. These rules were referred back to the committee for further consideration.

The additional rules for signal maintainers at interlocking plants were discussed at considerable length, and it was suggested that the rules avoid specifying practice and confine their instructions to employees of the signal department as in the case, for instance, where one of the proposed rules specifies that fiber insulation in pipe lines, insulated joints or insulated switch rods must be renewed by track forces in ample time to prevent failures. It was pointed out that the signal department has no right to specify the duties of track men and that the words "by track forces" should be eliminated. The discussion brought out the fact that if the rules referring to the care of lamps were separated it would materially add to the convenience in distributing the rules to employees. It was decided to refer back the proposed rules to the committee for revision.

R. C. Johnson, assistant signal engineer of the New York Central Electric Zone, and chairman of sub-committee "E" of Committee No. 3, presented an outline of specifications for the protection of drawbridges by electro-pneumatic power interlocking. C. E. Denney (L. S. & M. S.) suggested that the R. S. A. ought to co-operate with bridge engineers in preparing specifications for drawbridge interlocking, and a motion to the effect that the secretary be instructed to communicate with the American Railway Bridge and Building Association was carried.

The specifications for oil-cooled transformers and core type impedance bonds for use with direct current propulsion, submitted by H. S. Balliet, chairman of the Committee on Electric Railway and Alternating Current Signaling, were approved.

The report of Committee No. 9 on Wires and Cables was presented by W. H. Elliott. It is possible for a compound of comparatively low specific gravity to meet the present insulation requirements and still contain too little rubber per foot of insulation to give the best results. From the standpoint of the user the unit of volume would be a more reasonable standard on which to base the requirement as to the amount of rubber. A number of additions and changes in the specifications were presented. The principal ones consisted in increasing the minimum specific gravity to 1.85, increasing the minimum tensile strength to 1,200 lbs. per sq. in., materially reducing the test voltage and changing somewhat the allowable ingredients and the required method of vulcanizing.

It was suggested that tests be made in conjunction with the manufacturers to determine whether some wires that do not pretend to meet the R. S. A. specifications and do not depend on rubber alone for the preservative qualities are not in reality better. Mr. Elliott replied that the manufacturers have shown the committee their full process; and the committee lacks only the co-operation of signal engineers to carry on tests to find out how long wire of various kinds and makes will last. The committee believes that the new specifications will raise the requirements sufficiently by calling for a certain volume as well as a certain weight. Replying to questions, Mr. Elliott said that the specifications as now offered are the result of a study of eleven formulae given to him by the manufacturers. The motion originally made by Mr. Elliott to adopt the recommendations of the

committee was amended so as to exclude the paragraph (4) concerning the ingredients to be used in the mixture; and was then adopted.

The report of the Special Committee on Storage Battery was presented by R. B. Ellsworth (N. Y. C.), chairman, and consisted of a set of specifications for lead type storage batteries for power stations. In the discussion of the specifications the paragraph on separators, specifying that they shall be either of specially treated wood, hard rubber or a combination of both, was revised to allow wood only. The paragraph in the section on elements, stating that positive and negative plates shall be preferably of the pasted type, was referred back to the committee, and the remainder of the specification was approved with a few slight revisions.

Committee No. 4, on Automatic Block, through A. G. Shaver, chairman, reported that a change has been proposed in the specifications for caustic soda primary battery, to include barrel-shaped jars, and that it would be advisable to prepare specifications for galvanizing. The committee was instructed to prepare these specifications for the October meeting, and to make the necessary revisions in the specifications for caustic soda cells.

On Thursday afternoon, W. K. Howe, of the General Railway Signal Company, gave a short talk on the subject of voltage ranges, which had been discussed on the previous day.

Committee No. 7, on Definitions, was the last to make its report. A. G. Stradling, signal engineer of the Chicago, Indianapolis & Louisville, presented about 200 definitions which the committee had prepared. A number of revisions were suggested, and the committee was given a number of new words to define.

The meeting adjourned at four o'clock, after running practically on schedule throughout the entire four sessions. The total attendance was about 200.

PIPE LINES HELD TO BE COMMON CARRIERS.

The Interstate Commerce Commission in an opinion prepared by Commissioner Lane, has held that pipe lines are subject to the Act to Regulate Commerce as common carriers; and this notwithstanding various objections presented by the proprietors of lines. The substance of the opinion follows:

This is a proceeding instituted by the commission on its own initiative. The hearings held in various parts of the country developed certain facts which made it advisable that before continuing to a conclusion of the investigation certain questions of law should be argued before the commission. Accordingly, on the record made, seven questions were formulated and presented to the pipe-line companies, into whose operations the investigation had been made. These questions go to the power of the commission to regulate the rates, rules, and practices of these pipe lines as common carriers. These questions may be summarized into the one interrogatory: Have these pipe lines been placed under the jurisdiction of this commission as common carriers? We shall proceed to a consideration of the questions propounded.

QUESTION NO. 1.

Does the act to regulate commerce impress the obligations of a common carrier upon a pipe line engaged in the transportation of oil in interstate commerce, even though such pipe line was built over its privately acquired right of way, and (by pursuing a policy of refusing to receive oil into its pipes except as the purchaser of such oil) transports only its own oil?

Section 1 of the act to regulate commerce was amended in 1906 so that it applies to corporations or persons engaged in the interstate transportation of oil or other commodity, except water and except natural or artificial gas, by means of pipe lines and partly by pipe lines and partly by railway, or partly by pipe lines and partly by water.

The record discloses that the Prairie Oil & Gas Company, the Ohio Oil Company, and other of the pipe line respondents,

have never held themselves out to the world as common carriers, but have made it their business to buy oil at the producing well and transport it by means of their own pipe lines across the state lines and sell it within the other states. They claim to be dealers in oil who use their pipe lines solely to convey their own property from state to state.

Upon these facts the question is raised as to whether the provisions of the section of the act above quoted are applicable to such carriage. It is urged that Congress does not possess the power to require that pipe lines shall not engage in interstate transportation of oil excepting as common carriers. A safe construction, accordingly would be one which made the act to read as if written, "All pipe lines transporting oil between the states as common carriers shall become subject to the provisions of the act to regulate commerce." In short the claim is that Congress did not intend to bring under the jurisdiction of the act any pipe lines other than those which hold themselves out as common carriers.

We shall not consider the constitutional question here involved. If there were doubt in our minds as to the purpose of Congress, it would be proper to resolve that doubt upon the side of constitutional safety, but it seems quite manifest to us, from the history of this amendment to the act and from its language, that Congress intended to convert the interstate oil pipe lines of the country into common carriers. Whether Congress could lawfully so act is a matter for the courts judicially to decide. The Interstate Commerce Commission is an administrative body which may not presume to annul by interpretation an act of the federal legislature. So far as we are informed, the Supreme Court of the United States has never been called upon to pass upon a question of this character, and while it may be conceded that Congress could not impose upon a private pipe line the duties and responsibilities of a common carrier, it is not clear but that the provisions of this act could be upheld upon the ground that Congress was establishing a condition to which any pipe line company must conform which transported oil across a state border.

This seems to be the plain meaning of the act, that all pipe lines carrying oil from one state to another state, no matter what their previous status, should be thenceforward considered and deemed to be common carriers.

Pipe lines as facilities of interstate commerce were not included in the bill introduced in the Fifty-ninth Congress. On May 4, 1906, Senator Lodge, of Massachusetts, offered an amendment whereby pipe lines . . . were included in the act. During the discussion following the introduction of the amendment, it was suggested that it be limited by placing therein words which would make it applicable only to such pipe lines as "carry for the public." This was objected to by Senators Lodge and Nelson, who stated that the adoption of such language would practically nullify the provision, "because every one of these pipe lines can say, 'We refuse to do business for the public.'" There then followed considerable debate, and some further modifications, and the amendment passed the Senate, making the law applicable as above stated.

Throughout the discussion there is abundant evidence that Congress passed this act for the purpose of subjecting all interstate pipe lines carrying oil to federal regulation, and took this action consciously, in the presence of the very constitutional question now raised as to its power.

The answer to Question No. 1 will be in the affirmative.

QUESTION NO. 2.

Assuming Question No. 1 to be answered affirmatively, is such traffic divested of its interstate character by placing the ownership of the pipe line in a different corporation in each state through which the transportation passes, and by transferring title to the oil to each of such corporations contemporaneously with the entrance of the oil into the pipes of that corporation at the state line?

Discussing the case of the Oklahoma Pipe Line Company the

commission says: It is not denied that the oil when it leaves the Oklahoma points is at that time destined for storage in Louisiana and for ultimate delivery at Baton Rouge, La. At McCurtain, on the Oklahoma-Arkansas state line, possession passes from a common carrier to the owner's so-called private carrier. It also appears that title passes to the Standard Oil Company of Louisiana at the point called Ida within the state of Louisiana, and the transportation beyond to Baton Rouge is by that company as the owner of the oil through its private pipe line. . . . The change of title, breakage of bulk, stoppage in transit, or whatever it may be that happens at these state-line points, is not made in good faith for some necessary purpose. Therefore, when it is claimed that such an operation is not interstate in character, this claim is made in violation of the letter and spirit of section 7 of the act. The Supreme Court of the United States in a recent decision, *Dozier v. Alabama*, 218 U. S., 124 says:

What is commerce among the states is a question depending upon broader considerations than the existence of a technically binding contract, or the time and place where the title passed. It may be added that this state-to-state arrangement does not meet the Supreme Court test of state traffic. For after arrival of the oil at the state line, the owner does not "there and then for the first time and independently of any existing arrangement" with the pipe lines that had transported the oil thither, arrange for the transportation beyond. This is the test in the *Social Circle* case. 162 U. S., 184, 192.

But this state-to-state operation from Oklahoma to Baton Rouge, La., is supposedly accomplished by the location of pumping stations, or relay stations upon the state lines. Consider a line in its geometrical capacity, possessing only length, but neither breadth nor thickness, and contemplate the absurdity of such a line being the location of a pumping station, with its equipment of engines, boilers, tanks and accessories. Moreover, the record shows that these locations on the state lines exist only in the intent of the pipe-line companies—in fact, they are generally several hundred feet away from the line.

Our conclusion is that the traffic referred to is not divested of its interstate character by the devices shown in the record.

QUESTION NO. 3.

If a pipe line for the transportation of crude oil is built upon its privately acquired right of way, by a private corporation holding a charter subject to amendment or repeal, and the state wherein it was incorporated and wherein its pipe line is laid, later passes legislation declaring all such pipe lines to be common carriers, does such a pipe line, built before the enactment of such legislation, thereby become impressed with the obligations of a common carrier?

The Prairie Oil & Gas Company was incorporated under the laws of the state of Kansas in 1900. . . . In 1905 the Kansas legislature passed a law declaring all pipe lines common carriers. . . . No necessity exists for the consideration of the effect of this Kansas statute. The federal jurisdiction depends upon federal acts.

QUESTION NO. 4.

Does the utilization by a pipe line of the right of way of a common-carrier railway impress upon that pipe line the obligations of a common carrier?

The pipe line of the Prairie Oil & Gas Company is built for some 300 miles upon the right of way of common-carrier railways, among them the Missouri Pacific and the Atchison, Topeka & Santa Fe, the right so to build having been obtained from the railways.

While some doubt may exist as to the right by which pipe lines build on railway right of way, the mere fact that they are so built does not impress them with common-carrier obligations. This is so because the question whether a facility is

a public facility does not depend upon whether it exercises the right of eminent domain. Furthermore, in this question of federal regulation the nature of the title to right of way is not controlling.

This question must be answered negatively.

QUESTION NO. 5.

Does the utilization by a pipe line of a highway acquired for or dedicated to the public use impress on that pipe line the obligations of a common carrier?

In building pipe lines along public highways it has been the usual policy to deal with the owner of the abutting property in acquiring such highway rights on the theory that such abutting owners own also the fee in the highway. . . . We are of the opinion that a pipe line is not impressed with the obligations of a common carrier merely because, by arrangement with the abutting owner, it uses a public highway for right of way purposes.

QUESTION NO. 6.

Assume that throughout a series of years prior to November 1, 1905, the pipe lines of the New York Transit Company in the state of New Jersey, and the pipe lines of the National Transit Company in the states of New Jersey and Maryland, engaged in the transportation of crude oil for the Standard Oil Company of New Jersey, the Seep Agency and others, and that the New York Transit Company was a common carrier by pipe line incorporated under the laws of the state of New York, and that the National Transit Company was a common carrier by pipe line incorporated under the laws of the state of Pennsylvania; was such transportation by these lines in New Jersey and in Maryland transportation by them as common carriers?

It is clear that these lines entered New Jersey and Maryland in their corporate capacities and equally clear that their operations in these two states were part and parcel of their New York and Pennsylvania operations. The "delivery stations" at the state lines were not then in existence. Certainly the operations in New York and Pennsylvania were then, as they are now, common-carrier operations. These conditions sufficed to make them common carriers in New Jersey and in Maryland. It is immaterial that the patrons of the lines were few in number. The fact remains that these corporations held themselves out to carry through to their Bayonne, Bayway, and Baltimore destinations, and in fact did so carry for such as offered goods for transportation. They were, therefore, common carriers in New Jersey and Maryland within the usually accepted definition of "one who undertakes for hire to transport the goods of such as choose to employ him, from place to place."

Nor does the fact that these lines in New Jersey and Maryland did not exercise the right of eminent domain take them out of the common-carrier class. It is not the rule that because they exercise the right of eminent domain they shall be held to be common carriers, but rather that because they are common carriers they may be granted the right of eminent domain.

We hold that the transportation by the New York Transit Company in New Jersey and by the National Transit Company in New Jersey and Maryland, prior to November 1, 1905, was transportation by these corporations as common carriers.

QUESTION NO. 7.

Does the transfer by a common-carrier pipe line to a private corporation of a portion of its property theretofore used in its common-carrier operations, but not located in the state wherein it was incorporated as a common carrier, release that property from the obligations of a common carrier?

On November 1, 1905, the Standard Oil Company of New Jersey purchased from the New York Transit Company all the latter corporation's pipe-line property in New Jersey, and likewise purchased from the National Transit Company all of

that corporation's pipe-line property in New Jersey and Maryland. Discussing these transfers the commission says:

There is a line of authorities which permits a common carrier to abandon operations which cannot be profitably conducted, but no element of abandonment exists in this question. These New Jersey and Maryland lines, after November 1, 1905, handled the same flow of interstate commerce which had passed through them before that date.

The facts in the case show rather an arrangement whereby a common carrier divested itself of its terminals and turned them over to its principal patron for that patron's sole use. And the entire and complete failure of the government and of this commission to obtain any reason for this transfer of property on November 1, 1905, fairly warrants the inference that it was done in anticipation of legislation which was enacted in June, 1906, and which was foreshadowed by a governmental investigation.

The seventh question must be answered negatively.

In accordance with these conclusions, an order will be entered against the Oklahoma Pipe Line Company, the Prairie Oil & Gas Company, Standard Oil Company of Louisiana, the Ohio Oil Company, Standard Oil Company of New Jersey, the Tidewater Pipe Company, Limited, Producers & Refiners Oil Company, Limited, United States Pipe Line Company, Pure Oil Company, Pure Oil Pipe Line Company, the National Pipe Line Company, the Uncle Sam Oil Company, and the Uncle Sam Oil Company of Kansas, that they file with this commission on or before September 1, 1912, schedules of their rates and charges for the transportation of oil, in compliance with the provisions of the act to regulate commerce. (24 I. C. C., 1.)

TIE-TREATING PLANT AT GAINESVILLE.

The Atlantic Coast Line Railroad Company is erecting at Gainesville, Fla., a two-cylinder plant for the creosoting of its pine cross ties and such piling and structural timber as may be required.

The location is a level tract of land 180 ft. above sea-level adjoining its main line between Jacksonville and St. Petersburg, Fla. The storage yard, which is about 3,100 ft. long, has five tracks parallel to the main line. The plant proper is at the south end of the yard, the storage tracks leading from a ladder track which springs from the main line at the north end. All the track paralleling storage space is laid with a third rail for the handling of the 24 in. gage tie and piling cars.

The railway company is putting in the concrete foundations for the tanks and main building, and the retaining walls for the loading platform, while the Allis-Chalmers Company of Milwaukee, Wis., has the contract for furnishing and erecting all steel work, machinery and piping. These comprise two 150,000 gal. creosote storage tanks; one 45,000 gal. water tank and tower; an underground tank for receiving creosote from tank cars and for the quick handling of creosote in the impregnating operations; two overhead working tanks; a drain tank; two sap drums; two 150 h. p. internal furnace tubular boilers; one American ingot iron self-supporting stack, and other necessary standard steam plant equipment; an air receiver; two 138 ft. 7½ in. x 6 ft. 2 in. x ¾ in. cylinders, with specially designed doors at each end; two pressure pumps; one general service pump; an air compressor; a vacuum pump; a fire pump; a 30 k. w. generator; an experimental plant, complete with tank, cylinder and pump; all piping, thermometers, gage and miscellaneous fittings; a steel-frame building with corrugated iron roofing and sides; a narrow gage track scale; a fire line with hose and hydrants, and the necessary tie and piling cars.

The railway company previously owned at its export terminal docks, Jacksonville, three 250,000 gal. tanks. The Allis-Chalmers Company has equipped these with heating coils and

other necessary fittings, and has put up in addition one 500,000 gal. tank, giving at this point a total storage capacity of 1,250,000 gal. The same company has furnished and placed the pipe line from the tanks to the dock, and installed a small pumping station. Creosote oil will be received from tank steamers, and stored at this point, and transferred in A. C. L. tank cars to the Gainesville plant as required.

In the center of the creosoting yard, on a line with the cylinders is a 300 ft. loading platform, or dock, carrying three narrow gage tracks and flanked on each side by a depressed standard gage spur; for the transferring of treated material, timber and ties, from the cylinder cars to standard gage cars for shipment.

The tie and piling cars will be moved in the yard by a 19 ton narrow gage switching locomotive, and a locomotive crane will be used in moving piling and timber. Space has been provided in the main building, adjacent to the pump and cylinder rooms, for a machine shop, equipment for which is to be installed later.

Ties are to be air seasoned before treatment, and the full-cell process of impregnation followed. The majority of the ties now being bought carry only 10 to 15 per cent. of sapwood, being practically heart ties, and with the protection thus afforded are expected to last 18 years. The plant is designed throughout, however, so that the Rueping process may be used to the best advantage without change in equipment, if at any future time the adoption of that process and the treatment of sap ties shall become advisable. The yard has storage capacity for 500,000 ties, besides miscellaneous timber, and the plant will be able to treat about 1,250,000 ties annually.

The plant was designed by the Allis-Chalmers Company, and is expected to be in operation by September 1.

There has been considerable progress for the past year in construction of the Bagdad railway, Asiatic Turkey. This line, which commences at Konia, the terminus of the Anatolian railway, is to run to Bagdad, and when completed there will be through rail communication from Constantinople, Turkey, to Bagdad. In 1911 a new section of 25 miles from Ouloukishlou to Eregli was opened to traffic and about 50 miles of roadbed across the Adana plain was constructed which will soon be in use. The work of tunneling the Taurus and Anti-Taurus mountains was begun, and in a few years the railway will be open to Aleppo. This railway is a German concession and the construction material is principally from Germany. The company which has this concession is also furthering the irrigation of the country adjacent to its line and has already executed a plan for the irrigation of the district of Konia. Its engineers are now studying the feasibility of irrigating the plain of Adana to make it more productive. An aerial railway for the handling of cargo at the port of Mersine was also built by the Bagdad company which, however, seems to have abandoned its original intention of constructing harbor works at Mersine and is preferring the port of Alexandretta as its terminus for Syrian and Mesopotamian traffic.

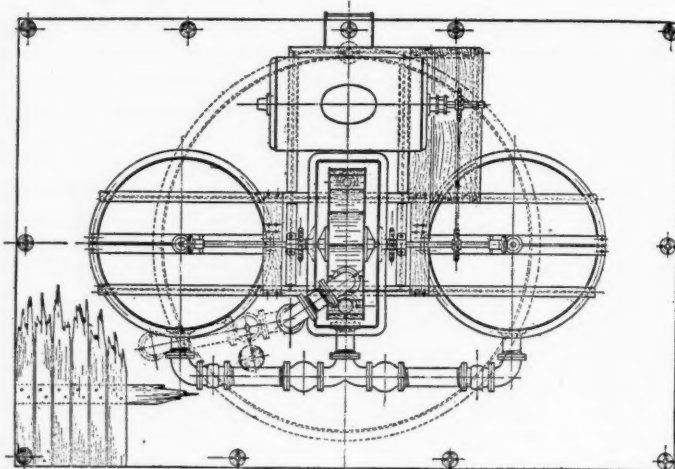
Extensive plans for the electrification of the London suburban railway lines are under serious contemplation. These involve the substitution of electricity for steam on some hundreds of miles of railways in the London district. The advantages of electrical operation for handling such traffic have been so completely demonstrated that the question has largely passed out of the technical into the financial phase. In some cases the terms on which the necessary capital for conversion could be raised are such as to induce railway boards to postpone the work of electrification until the latest possible date, and in no instance is the provision of the large funds for converting to electric working a large mileage quite a simple problem. The railways which are considering the subject of the electrification of portions of their lines are the Great Eastern, the Midland, the Great Northern, and the Lancashire & Yorkshire.

LORD WATER SOFTENER.

An automatic water softener or purifier, known as the Lord Model A, is shown in the accompanying illustrations. The water enters through the inlet pipe and passes over a water wheel, which furnishes the power for the operation of the filter. The shaft supporting this wheel is connected by a chain drive with a horizontal shaft above the two mixing tanks, which in turn is connected by miter gears with two vertical shafts, equipped with paddles for agitating the water in the mixing tanks, thus aiding the precipitation of the injurious solids. This water wheel also drives paddles in a chemical storage tank, which continually agitates the solution of chemicals so as to keep them of a uniform consistency and strength. These purifiers are also equipped with chemical measuring valves to regulate the amount of chemicals used from time to time. The dumping bucket also operates a series of lower valves, by opening and closing them at proper intervals, thus giving complete automatic action.

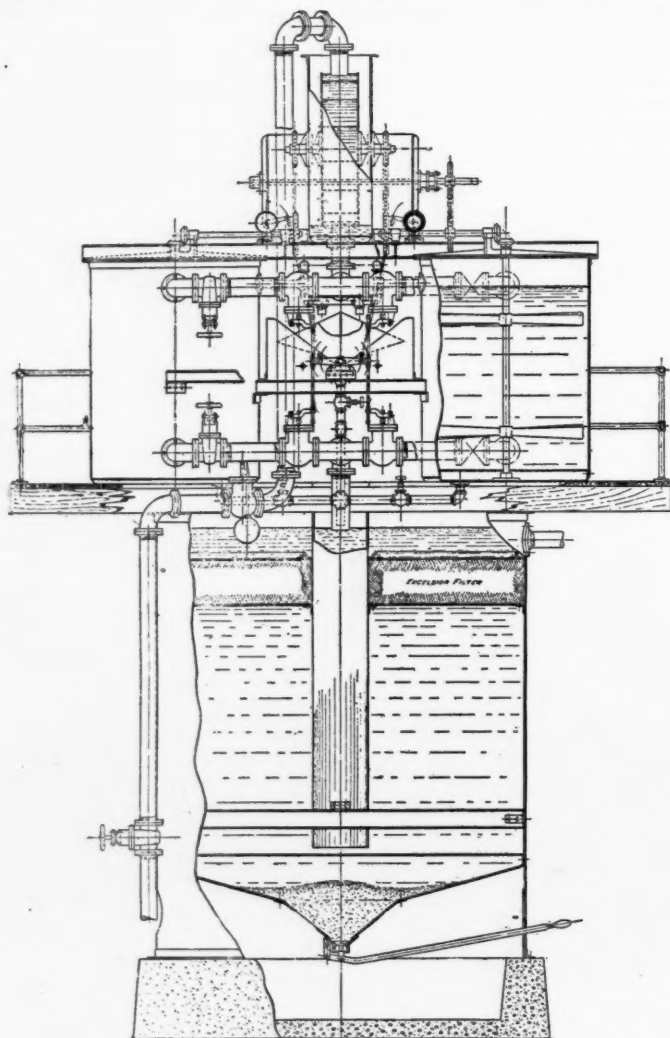
After the water leaves the water wheel, it enters the upper line of pipe and flows first to the right and then to the left. The flow is regulated by the lever valves referred to above, which are connected with the inflow and outflow pipes. For example, the water first passes through the pipe leading into the right hand mixing tank until this tank is completely filled. After this a sufficient amount of water overflows through a pipe in the upper part of the tank into the dumping bucket, which tilts and closes one upper valve and opens the lower valve directly underneath, thus allowing the water to flow from the mixing tank and enter the main filter tank of the purifier. This action is then repeated in the left hand tank and goes on indefinitely until the storage tank is filled. After the

agitation is completed, the water next flows through a center partition or cylinder into the main filter tank, which separates the raw water from the treated water after it flows upward through the filters and overflows into the storage tank at the side, or directly into the boilers.

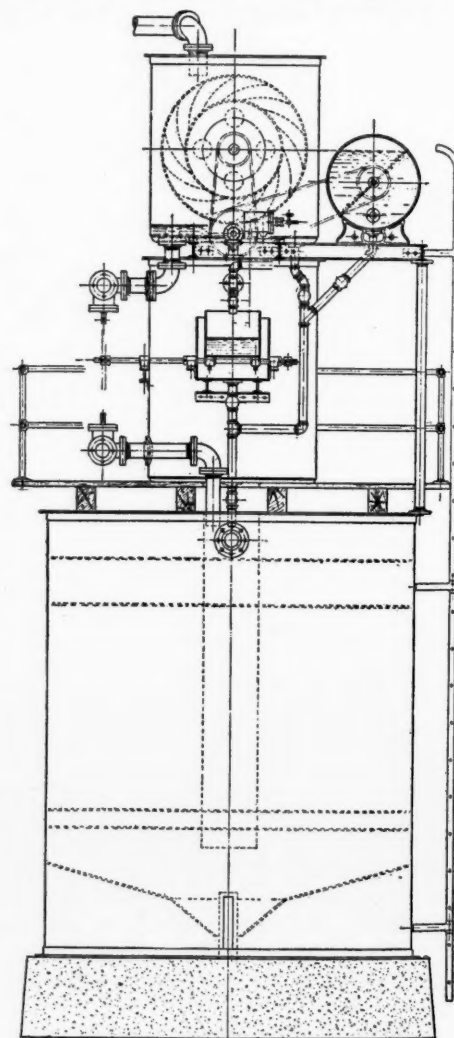


Plan View of Lord Water Softener and Purifier.

The precipitates in the meantime settle into the funnel-shaped base of the filter tank. Some of these may be carried up a slight distance, but being of a heavy nature the tendency is to settle, and on the downward flow they naturally come in contact with other particles rising and unite with them, causing them to fall to the base of the purifier where they are re-



Lord Water Softener and Purifier.



moved through a sludge valve into the sewer. The filters remove any remaining trace of precipitates.

The drawing shows the chemical measuring valve which holds a definite amount of the reagents furnished for precipitating the injurious solids. This valve is equipped with an inner measuring cup and a brass sleeve on the outside cover, which the cup slides back and forth. The cup itself has an opening at the bottom, and a small opening or air vent at the top, which allows the air to pass in and out at proper intervals. The valve is operated by a dumping bucket as it tilts back and forth, which causes the opening in the inner cup to rotate back and forth, so as to come directly in contact with the two ports on the right and left, one of which is connected with the chemical storage tank, and the other with the mixing tank. This allows the measuring valve to be filled and emptied at regular intervals, making the action an entirely automatic one. In this way a definite amount of chemical solution is fed into the mixing tank at regular intervals, the amount being so regulated as to be of sufficient strength to precipitate all the injurious solids in a tank of a given size. The float valve connected to the inlet pipe is operated in connection with the storage tank, and controls the entire system. This water softener is made by the George W. Lord Company, Philadelphia, Pa.

JOURNAL TURNING LATHE.

It is often necessary to refinish the journals on car axles when the wheels are not to be removed from the axles. With the more general introduction of the steel wheel in freight service this operation is becoming continually more frequent. A machine suitable for this purpose must of necessity be constructed to turn out accurate work since the cuts taken will be light and perfect roundness is desirable. If the axle is carried on the centers only, as is generally necessary where an old machine is adapted for this purpose, there is bound to be more or less springing of the axle on account of the heavy wheels. This will cause some lost motion at the centers that will be reflected in the quality of the work.

While some of the older designs of car wheel lathes were arranged and fairly well suited for journal turning, these machines are generally pretty well crowded with the work for which they are best adapted and, in fact, the more modern tools of high capacity are not even arranged to permit journal

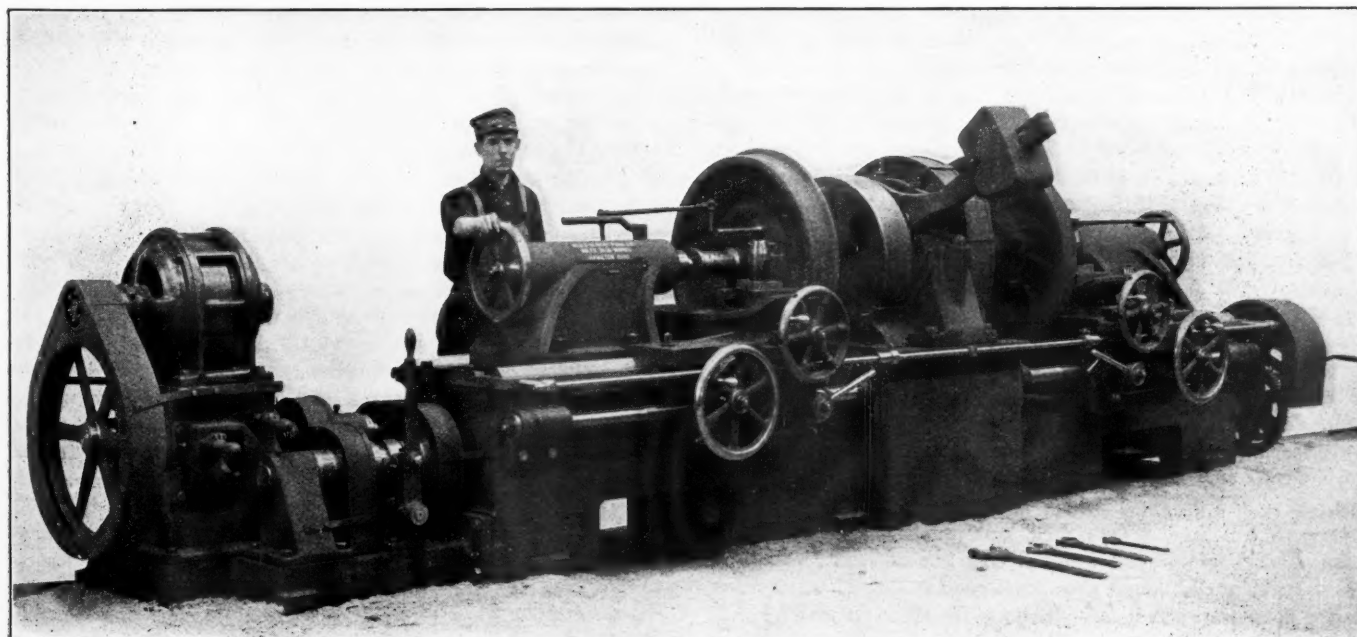
turning. Recognizing that a demand already exists which will become more insistent, the Niles-Bement-Pond Company has designed a machine especially for this purpose. It is arranged for center drive with a gap in the center head for putting in and taking out the axles, and is provided with suitable speeds and feeds for rapid, accurate turning and rolling of the journals. It has a capacity for axles carrying wheels up to 42 in. diameter on the tread. Both journals can be finished at the same time.

While the journal turning will not require much power, the machine is designed throughout and is well suited for axle turning, if a somewhat larger motor is provided. Arranged for both kinds of work, this machine could probably be kept busy in practically any shop where it would not be advisable to install it for journals alone.

The driving mechanism consists of two driving pinions so arranged that when one is opposite the gap the other is in mesh and performs the work alone. The top bearing at the center is hinged at the front of the machine and is provided with a counterweight. It is opened by simply loosening one nut on the clamping bolt, which is then swung out and frees the bearing, permitting the pair of wheels to be quickly handled. The driving dog is carried on an automatic adjustable driver plate and is so constructed that it may be quickly applied, and has a powerful grip. The arrangement is such that the axle does not spring under the strain of the cut. The feed gears are supplied with a quick change arrangement, using a sliding key, and they give all the necessary feeds for turning and burnishing.

The machine shown in the illustration is fitted with an alternating current, constant speed, motor which makes necessary the group of gears shown between the motor and the bed of the machine. Where a variable speed, direct current, motor can be used, this gearing will not be required. A 10 h. p. motor is suitable for journal work only, but if the machine is also to be used for axle turning, a 25 h. p. motor should be used.

Some new types of invalid cars have been built for the Austrian state railways. The first-class cars are equipped with a cooling apparatus for use in summer. The second and third-class cars are so made as to be easily converted into ordinary passenger cars, and after being used by an invalid for a journey they can accommodate the normal number of passengers for the return trip. This has resulted in the reduction of the charges for second and third-class invalid transportation.



Motor Driven Journal Turning Lathe.

MAINTENANCE OF WAY SECTION

THE past month has been marked by unusual floods in many parts of the country, the most serious results having occurred along the Platte and the lower Ohio and Mississippi rivers. Although high water was generally feared, after the heavy rains of the early winter, followed by the unusually heavy snows, the floods have exceeded all expectations, and have washed out large amounts of railway track. These conditions have created emergencies requiring not only the greatest ingenuity possessed by the bridge supervisors, but also the most continuous watchfulness and work on their part. Such emergencies are fully as serious to the bridge and track departments as were those caused by the cold weather and heavy snows of the past winter. The trouble will not be ended when traffic is fully resumed, for both bridges and track will need careful attention until settlement has been completed, which will require a considerable time.

CONTRIBUTIONS to the contest on Bridge Kinks should be sent in promptly in order that they may be received before June 25, on which date they will be turned over to the judges. The limits of the contest have been made sufficiently broad to include any kink coming within the field of bridge work. Those applying more directly to concrete work, which were excluded from the Construction Kink Contest last winter, are eligible at this time, as are also those relating to the construction, repair or renewal of bridges of steel, timber or other material. The field is very large and the opportunity for the development of these kinks is great. The conditions under which bridge work must be done, such as stage of water, traffic, time of completion, etc., frequently make necessary the adoption of special methods which are, however, many times capable of wide adoption, at least in general outline. Prizes of \$25 and \$15 will be awarded for the two best contributions, while others accepted and published will be paid for at our regular space rates. All contributions should be in the hands of the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, by June 25.

THE next contest in this section will be on the subject of "Tools," and will include descriptions of tools which can be employed to advantage in any branch of maintenance of way work and which are not now in common use. Within these limits will come the many devices which have been worked out to meet certain needs locally, and which may be capable of wider application, but which have not been patented and placed on general sale. Descriptions of these devices should be clear and explicit, and should, if possible, be accompanied by sketches or photographs that their construction may be well understood. The descriptions should include statements of the relative advantages of the tools described over those more commonly used, as the awards will be based largely on the importance of the improvement made. This contest will include many more or less simple track tools, such as improved tamping bars, or shovels, and similar devices in the bridge, water service and other branches of maintenance work, as well as the more complicated machines for doing heavier work, such as small derricks, etc. Nearly every supervisor of bridge, track or water service has made special tools for his own use. Many of these are available for wide use if brought to light. A number have already been received in the different bridge and track kink contests which have been published. One such kink published in these columns, describing a device which it cost less than \$5 to make in the company shops, saved over \$250 per month on one division of one road last year. The field for the development of such devices is large and the number of them is rapidly increasing. Prizes of \$25 and \$15 will be paid for the first and second best

contributions, and we will pay our regular space rates for all others accepted and published. All contributions must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, by August 25.

THE need of keeping the entrances to all culverts and bridges free from brush and other obstructions is well known, and yet it is not uncommon to see the channel leading to a bridge remain partially blocked for some time and to learn of washouts and other troubles resulting from these conditions. Master carpenters and bridge supervisors should be continually on the watch for such conditions and should also see that the bridge and track foremen are instructed regarding the necessity for keeping all channels clear. At this time of year, when bridge repair and renewal work is under way the foremen will occasionally leave refuse lumber or piling lying in the stream, which is likely to cause trouble at the first freshet. The damages arising from blocking a waterway are not confined to those from washouts, although these are probably the most serious, but damage claims following the backing up of water on to adjacent property can very frequently be traced to the same cause. Much ballast is also damaged or destroyed by water flowing over the track and depositing mud on it which cannot be entirely removed. From this time on through the summer freshets may be expected any day without warning, so that it is necessary constantly to be prepared for them. The time and care spent in carefully studying the drainage area and the local conditions in order to provide a suitable waterway are wasted unless equal care is exercised by the maintenance forces to keep the channel open. As an illustration of the results of blocking the channel the experience of a large road last year may be instructive. When heavy engines were introduced on one division a bridge across a small stream which was subject to quick floods was found to require strengthening. As a temporary expedient piling was driven as additional support. Following a heavy thunderstorm the creek rose one night very suddenly and deposited a large amount of debris against this piling. The water was forced over the track, washing a large opening in the line as well as in that of an adjoining road, and putting the main lines of both roads out of service for several hours. The cost of properly strengthening the bridge in a permanent manner may have justified taking the chance on such a flood occurring, but the results were disastrous and the damages amounted to far more than the cost of doing the work properly in the first place.

WE publish elsewhere in this issue three discussions of the hobo as a track laborer, prepared by men who have handled this class of labor extensively; and we hope to follow these in succeeding months with similar discussions of the Italian, Mexican, negro, Japanese and other nationalities employed extensively in track work in various parts of the country. While the local supply of labor is usually such that only one or two classes of labor are employed to any extent in one locality, the limits between the portions of the country in which the different nationalities predominate are rapidly changing. The hobo has practically disappeared from the eastern states and is now only found to any extent in the central states, where he is fast diminishing in numbers. The Italian and Greek predominate in the eastern states and are rapidly moving westward. The Mexican, who, a few years ago was found only in the southwest, has now moved as far east as Chicago, and is found in large numbers in Missouri, Kansas and adjoining states. The Hindu is increasing in numbers on the Pacific coast. Therefore, the man who is handling a certain class of labor today may be called upon to work men of an-

other nationality and of different characteristics and ability tomorrow. It is our purpose in presenting these discussions to give the experience of men who have handled successfully the kinds of labor mentioned, for the information of those who may be called upon to handle them. No two classes of labor can be handled in the same way. Many supervisors and foremen who meet with success with one kind of men are less successful with others through their failure to understand them and to adapt methods to their peculiarities. For instance, the severe methods of handling the southern negro would drive the more sensitive Japanese from the work. Likewise, the provision that must be made for feeding and housing the men vary with the different nationalities, as does their ability to handle different kinds of work. The average supervisor at the present time does not have the opportunity to learn these different characteristics of more than three or four nationalities at most, and when new men are sent to him, with whom he is unfamiliar, he is forced to do more or less experimenting before he comes to understand them and to get the best results. It is to be expected that differences in opinion regarding the relative value of the different classes of labor will appear in these discussions, based upon the varying individual experiences of the writers, and it is for this reason that we plan to present the ideas of three or four men, that the reader may be better able to get the information that will best meet his requirements.

THE method of tie distribution and renewal on the Rock Island which is described elsewhere in this issue, indicates the thoroughness with which this feature of maintenance work is studied on this road. While some other roads, perhaps, give the same amount of attention to this subject, this is not the case in many instances. The importance of a careful study of the subject is not always realized, and can best be emphasized by noting the report of the Interstate Commerce Commission for the year ending June 30, 1910, which shows that while .922 per cent. of all operating expenses was for rail, 3.099 per cent., or over three times as much, was expended for ties. This latter amount was over one-seventh of all expenditures for maintenance of way and structures. In the method described not only are the estimates of ties needed for the year carefully prepared by the roadmasters after close personal inspection of the track, but they are closely studied in the general offices, in the light of expenditures made in previous years and on other subdivisions maintained under the same general conditions. Likewise, the program of tie distribution is carefully planned with reference to the source of supply as well as to the importance of the tracks in which the ties are to go. Hauling ties back and forth is restricted as much as possible by following this definite program in making shipments. This in itself is a feature which is sometimes overlooked and the amount of needless hauling back and forth is not realized until statistics are collected. Very frequently the idea prevails that because the company is moving its own material it costs nothing to haul it, but whether or not this cost is charged directly against the material, it is present. Likewise, with the rapidly increasing cost of ties, the necessity is becoming more apparent for classifying them according to the service they give under the various densities of traffic and distributing them accordingly. Following this plan, a certain stretch of line over which the same amount of traffic passes, will be laid throughout with the same kind of ties. It is not a great step in advance of this to further distribute the ties according to the roadbed conditions, and place the strongest ties where the roadbed is weakest and the load upon the ties therefore the heaviest. For instance, ties on an unstable, wet roadbed require more strength and heavier preservative treatment than do those in a dry, rocky cut, and the roadmaster can well take these conditions into consideration when distributing his ties. Economy in tie renewals begins first with a careful inspection of the ties to see that none is removed which is fit for further service in the track consistent with the

proper maintenance standards, and continues through the selection of the tie to replace it, its treatment, its transportation to the place of renewal and its installation in the track.

THE AMERICAN RAILWAY ENGINEERING ASSOCIATION.

THE practical value of the work being carried on by the American Railway Engineering Association is best indicated by the proceedings of the thirteenth annual convention, copies of which are now being distributed among the members. Although the proceedings this year are bound in one volume, they contain over 1,200 pages, and include reports of nineteen standing committees, and several special committees.

The history of this association is unique, for few, if any, similar associations have attained so great prominence and have been recognized as the authority in their field in so short a time. It has now reached such a stage that with proper guidance its future is secure, as it has passed through the critical period of rapid growth, and has now settled down to a more steady, but nevertheless continual development.

Because of its position the association has a great field for activities before it, and fills a place which it was not possible for any other organization to fill. Being free from any official backing by the railways, its members express their views as individuals and work out the problems which are of common interest to them as engineers in responsible charge of work on American railways. Through such an organization data from many roads can be compiled and studied, and results secured which are much more accurate than it would be possible to gather from any one road, because of the influence of local conditions. This has been especially true in the study of rail failures, where the reports from eighty-three railway companies were collected and tabulated last year.

Another advantage which is possible is the undertaking of investigations of important subjects of interest to all roads which the individual roads cannot undertake because of the expense or lack of facilities. The association can serve as a common agent to prosecute such studies, and the results are available for all, eliminating in this way needless duplication and confusion. As these investigations are carried on directly by committee members or by trained investigators working under the direction of the committees, it is possible to secure data in a shape capable of direct application to the problems of the railways. Work of this kind will doubtless be taken up by the association more and more as it assumes its proper position as the common agent of the railways to investigate all problems of an engineering nature.

The rail investigation is a conspicuous example of the kind of study possible only by such a society. The committee last year consisted of 23 men, most of whom were chief engineers or consulting engineers in direct charge of rail investigations on their respective lines. The study of this subject, probably the most important one which has been undertaken by the association, has been carried on continuously since its organization. As a result of this, specifications for the manufacture of rails were presented by the committee and adopted at the last meeting, under which rails are now being rolled. It is expected that these rails will show a marked improvement in service over rails which have been rolled during recent years. Studies of such specifications properly come within the scope of this organization. Although the earlier investigation of the rail question was conducted by the American Society of Civil Engineers, only a portion of whose members were directly interested in railway operation, it was very properly relinquished to the new organization.

An important feature of the work of the association is the preparation of standard plans and specifications for various materials, in this way promoting uniformity among the different roads. Most roads now have their individual standards, which are the result of the combination of the ideas of different men on those roads. The association is trying to still

further combine the standards so that they will be suitable for all the roads, or at least for those which are operating under similar conditions of traffic and climate. The standardization of material is of direct economy in making purchases, to the roads that adopt the standards, and to other roads as providing standards of good practice for guidance.

The value of the association's investigations to the individual railways cannot be overestimated, and its field of usefulness is rapidly broadening as the operation of the railways is tending more and more along scientific lines. The future will demand more and more studies of this nature, and the work of the association must of necessity be greatly increased to enable it to maintain the important position it now holds.

With the growth in the work of the organization, a natural increase in expenses is to be expected. The association derives no financial assistance directly from the railways, this assistance being confined to encouraging their men to maintain membership in it and to offer facilities for special study and experimental work. The strength of the association is very largely due to its representative membership, especially among the higher engineering officers, combined with the fact that these men have given freely of their time and energy to further its work. This membership, however, is far from complete, especially among the younger men, many of whom hesitate to join or do not realize the value of membership. It is among these younger men that large increases in the membership are possible. Membership in the association has come to denote progress, and to stand as a distinct credit to a man. The reports and bulletins are of much value, and are coming to be sought more and more as books of reference by those outside its membership.

From the standpoint of the association a larger membership is desirable in order to increase the funds available for more work. Large economies have been effected in the conduct of its affairs during the past year, but the limit in this direction has been closely approached, and it will be regretted very much if its work shall be held back in any way because of lack of funds.

From its inception the association has refrained from soliciting any aid from the manufacturers and sellers of railway supplies, not because of any hostility to them, for its attitude towards the Railway Appliances Exhibition, held in connection with its annual convention has been that of most hearty support; but rather because of the desire to be free from the criticism sometimes directed at other associations. For this reason it is to be regretted that the association has considered it necessary to solicit advertising to secure sufficient funds to meet its current expenses. That the board of directors does not like this course, and adopted it only as a temporary expedient, is evidenced by the statement of the retiring president, W. C. Cushing, who said in his annual address last March that "the members of the board are opposed to this principle and would not resort to it except in case of emergency." It is to be hoped that the railway men who enjoy the benefits of the association, but have not allied themselves will do so, not only that the association may maintain the high standards which it originally set for itself, but that because of the additional support the work of the association may continue to advance and the members receive even greater privileges and advantages than now.

NEW BOOKS.

Subways and Tunnels of New York. By Gilbert H. Gilbert, Lucius I. Wightman and W. L. Saunders. Bound in cloth. 6 in. x 9 in. 372 pages. Illustrated. John Wiley & Sons, New York. Price, \$4.

The authors state in the preface that the aggregate cost of the tunnels of New York has probably been as great as that of the Panama Canal. The obstacles encountered have been stupendous in magnitude and difficulty and have called for engineering skill

of a very high order. The tunnel and subway system which is the result of traffic conditions entirely without parallel in any other city includes a complete subway system connecting the three boroughs, eight subaqueous tunnels under the East river, six subaqueous tunnels under the Hudson river to the mainland, two subaqueous tunnels under the Harlem river to the Bronx, the Belt Line tunnels and New York subway of the Hudson & Manhattan system and the Bergen Hill and crosstown tunnels of the Pennsylvania Railroad. The construction details of these undertakings are completely covered, cost data, plant layouts and methods of operation being particularly emphasized. A great deal of historical data and a number of appendices on methods and devices used in the construction of the tunnels are included. The authors pay a high tribute to the three men who have been most instrumental in the building of the various tunnels. Delos E. Haskin was the man who first proved the practicability of tunneling through the silt under the Hudson river. Charles M. Jacobs built the first tunnel under the rivers about New York, namely the East River gas tunnel. He combined the genius and enthusiasm of Haskin with the ability of the engineer. William G. McAdoo planned and executed the Hudson & Manhattan System and has added to the qualifications of the other two that of the business man.

Concrete Costs. By Frederick W. Taylor and Sanford E. Thompson. 5 in. x 8 in. 709 pages. 75 illustrations. 166 tables. Cloth binding. John Wiley & Sons, New York. Price, \$5.

Although prepared especially for the use of architects, engineers and contractors engaged in building construction, "Concrete Costs" contains a great deal of information for railway engineers. The knowledge of detailed costs on railway work, particularly on large work handled by company forces, is often very limited with a resulting lack of efficiency. Some of the costs given in the tables printed in this book will not apply to the conditions under which railway work is done, but no claims are made for a universal application of the tables, and the authors have been very careful to indicate the proper use of all data furnished and to outline carefully the conditions under which it can properly be applied. The figures given for the cost of transporting concrete materials, mixing both by hand and machine, building forms, finishing concrete surfaces and a great many of the details of plant layout and form construction, are of direct application in planning and carrying out the work of building abutments and piers, retaining walls, foundations, subways and other concrete structures for railways. One of the distinct features of the book is the fact that most of the information contained in its tables was secured by observations on workmen regularly employed, which makes the data of more value than that which is usually prepared by keeping records of time and work accomplished on complete pieces of work. The authors state that in the preparation of the book the work was divided into three sections: (1) An analysis of all the work connected with concrete construction, separating efficient from inefficient movements of the workmen and then studying with the stop watch the proper time for making each elementary movement; (2) a grouping of these series of movements to obtain the proper time allowance for each class of work, and the classification and tabulation of this data so as to place it in a simple and convenient form for practical use; and (3) the testing of the value of the data by computing from the tables the time necessary to build a structure and then comparing the "book time and cost," with the "actual time and cost." As pointed out by the authors, cost data is of comparatively little value without a knowledge of the proper way to use it. In the introduction of scientific management the first essential is the introduction of standard methods. To assist in the application of the data presented considerable material has been included in the book which will be found very useful in deciding on such standard methods and in training workmen to use them.

THE ERIE TRACK INSPECTION CAR.

Apparatus Designed to Detect Inequalities in Line and Surface of Track and to Make Record on Paper and on the Track.

BY E. G. CHENOWETH,
Mechanical Engineer, Erie, Meadville, Pa.

In order to ascertain the condition of the track with reference to the gage on tangents and curves, the elevation of the outer rail on curves, low joints and other irregularities in rail or road bed which in any way endanger the safety of high speed trains, and to make comparisons with established track standards, an inspection car containing track testing and registering apparatus has been designed and is now being operated by the Erie.

The track inspection car is built on the general plan of a business car, a passenger car being reconstructed in the company

The car is lighted throughout with 32 volt Tungsten car lights, operated by a standard, axle driven, belted, car lighting generator in connection with a battery of 16 storage cells. The electric lights are supplemented with standard Pintsch gas fixtures.

RECORDING APPARATUS.

The apparatus for the detection of track irregularities is designed to automatically indicate to the track man by the ejection

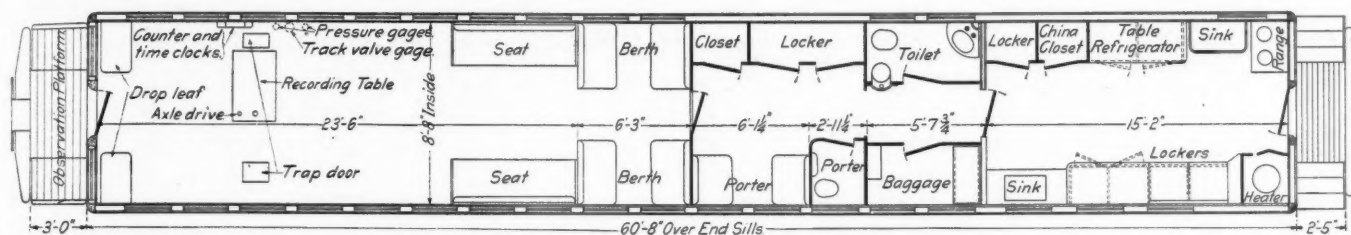


Fig. 1—Erie Track Inspection Car, Floor Plan.

car shops for this purpose. The length of the car is 66 ft. 1 in. It is provided with a 3 ft. rear observation platform and a 2 ft. 5 in. front platform. The observation room in the rear is 23 ft. 6 in. long and 8 ft. 8 in. wide, and is provided with the largest window space available in the rear so that an extensive view of the track is obtained. In front of each rear observation window is a drop leaf table 18 in. x 30 in. The recording table is placed nearly 7 ft. from the rear door on the left side of the car. On the right of the recording table is a trap door 12 in. x 16 in., while on the left is another one 9 in. x 16 in. which permit taking care of the machinery and keeping it oiled. To the

of colored liquids upon the road bed, imperfections of track alinement and to make autographic records for office use and for reference of irregularities of track surface, variation in gage, cross level and car swings, lurches, speed and distance traveled and time in five-second intervals.

The fluctuations in track condition are recorded upon a strip of moving paper, by means of stylographic pens. These pens are arranged in two sets, one of which being stationary, establishes a series of horizontal datum lines, while the other pens have a motion at right angles to the datum, this motion being controlled by the various track imperfection detecting mechanisms



Fig. 2.

left of the recording table, where they can be conveniently seen by the operator, are five counter clocks in a glass case, as shown in Fig. 6. The operator sits at the recording table facing the rear of the car. At his right hand is the three way air valve for raising and lowering the track gauge. Near the counter clock case is a pressure gage showing the air pressure available. Toward the front of the observation room are lounge seats on each side of the car with lockers below. In front of the observation room there are berths for sleeping purposes, lavatories, kitchen, etc.

and being limited by the extent of these imperfections. As the paper moves under the pens at a rate directly proportional to the car speed, the indications of track irregularities appear in their true relation and can be located at any time as may be necessary.

THE TRACK SURFACE DEVICE.

The purpose of this apparatus is to provide means for the detection of low joints and unsatisfactory conditions of track surface. Vertical movements of the central axle of a six wheel

truck relative to the outer axles, are utilized to indicate the existence and extent of imperfect surface alinement. The mechanism consists of 6-in. I beams mounted over the side sills of the truck and supported at the ends by stanchions, which are fastened to the front and back journal boxes, as shown in Fig. 3. Two plates are bolted on the middle journal box outside and inside of the pedestal. These plates are free to move vertically in yokes attached to the I beam, and their movement in a vertical direction relative to the beam is transmitted to the recording apparatus, by means of a suitable phosphor-bronze wire carried

THE GAGE VARIATION DETECTOR.

The rear six-wheel truck has a two-wheel trailer attached, with its wheels arranged to slide on the axle, as shown in Fig. 4. A system of springs compel the wheels to follow all gage fluctuations, and by means of a phosphor bronze wire these variations are transmitted to the stylographic pen, through suitable brass sheaves and levers.

In order to prevent unnecessary operation, the trailer is flexibly connected and may be raised to clear the track, when so desired. While being raised a spiral clutch automatically grips the wheels

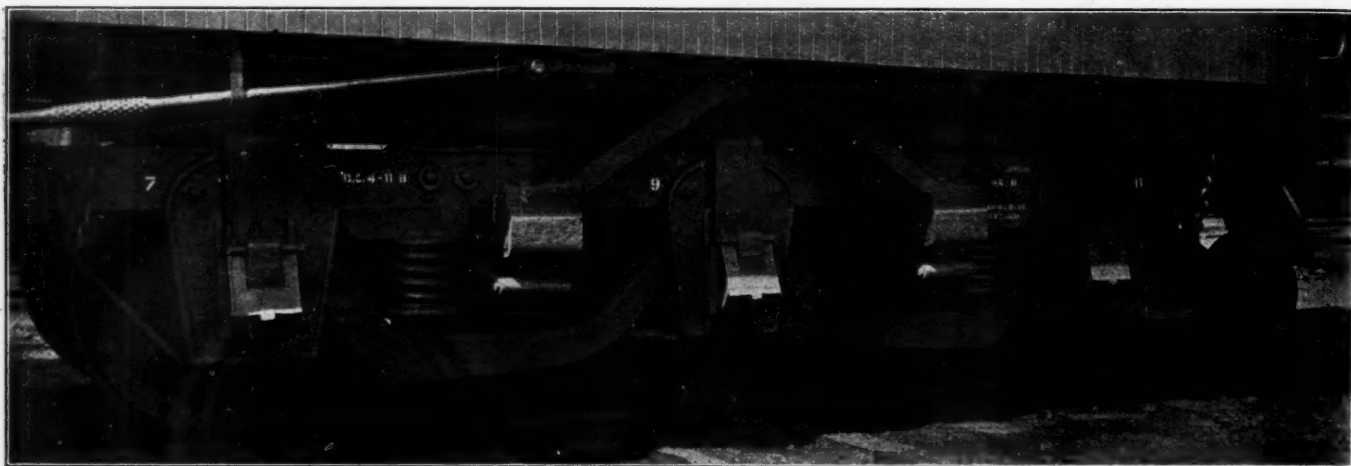


Fig. 3—Arrangement of Apparatus for Detection of Low Joints; Erie Track Inspection Car.

on brass sheaves. This mechanism is applied to each side of the truck and indicates the defects of both rail surfaces simultaneously.

Two sets of adjustable electric contact points are provided on each of the outside plates, fastened to and moving with the middle journal boxes. These points are arranged to make connection with corresponding contacts carried on the I beams. Whenever a variation of track surface amounting to $\frac{3}{8}$ in. or over is encountered, one set of points makes an electrical contact and the condition is automatically registered by means of a counting mechanism. In a similar manner, all irregularities of $\frac{5}{8}$ in. or more are registered by the other set of contact points, suitably connected in series with the car storage batteries and counting apparatus. It is further provided that when either a $\frac{3}{8}$ in. or $\frac{5}{8}$ in. variation in surface alinement is registered, an electro pneumatic spotting valve simultaneously opens and ejects a colored liquid upon the road bed, thereby marking the location of the defects.

and draws them inward until they register 4 ft. 8 in. in gage, so that when lowered the trailer wheels will fall correctly inside a 4 ft. 8½ in. standard gage track. The raising and lowering operations are pneumatically performed, and are controlled by means of a three-way air valve, conveniently located in the car observation room.

THE CROSS LEVEL INDICATOR.

Objectionable car swings owing to imperfect cross level conditions are indicated, and their extent recorded by the motions of a heavy pendulum, swinging in a plane at right angles to the center line of the track. To avoid disturbing effect of sudden lurches and minor vibrations, this pendulum is immersed in oil, which effectually dampens its action and prevents the recording of conditions other than those for which the device is intended. The action of centrifugal force upon the pendulum



Fig. 4—Apparatus for Detection of Variations in Track Gage.



Fig. 5—Interior of Car, Looking Towards the Rear.

when rounding curves is compensated for by an adjustment in the recording arm connection. The effect at various speeds is thus controlled so that a true record of cross level conditions is registered by the stylographic pen.

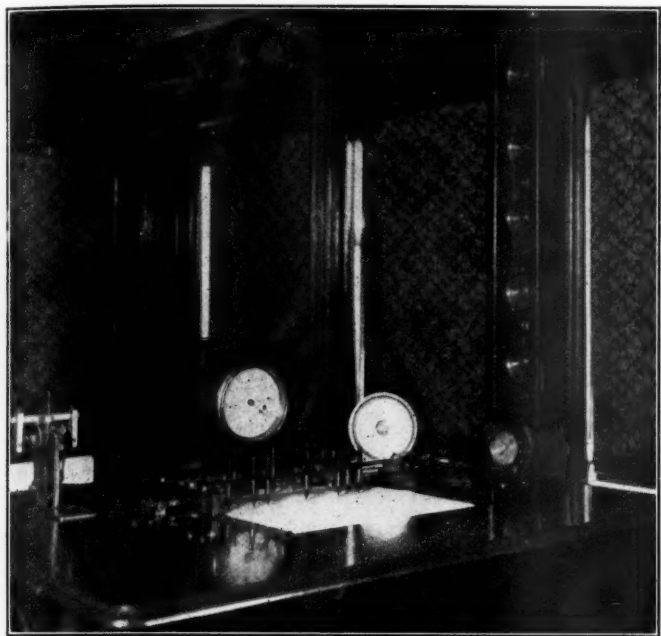


Fig. 6—Operator's Table, Recording Apparatus and Counter Clocks; Erie Track Inspection Car.

THE LURCH RECORDING DEVICE.

This apparatus is a more sensitive mechanism than the previously described cross level indicator. Its purpose is the detection of minor vibrations and sudden car lurches caused by various imperfect track conditions. The device consists of a pendulum which swings in a plane at right angles to the center line of the track and carries two copper balls, each secured to the end of a light band steel spring, which in turn is fastened at one end to the pendulum blade by an adjustable screw clamp. The copper balls are thus free to vibrate at the end of steel springs held in a vertical position and parallel with the pendulum. A sudden car lurch produces a corresponding motion of the pendulum. This motion, transmitted to the copper balls through the flexible steel springs, causes one of them to fly out and make electrical connection with suitable contacts. The pen registering car lurches is electro-magnetically operated, and when the copper ball makes a contact the otherwise continuous car lurch line is notched, which notch constitutes a record of an objectionable track condition causing the lurch.

An electric counting mechanism and electro-pneumatic spotting valves are also wired in series with the above recording apparatus; thereby each individual defect is automatically counted and the track simultaneously marked with a colored liquid.

SPEED, TIME AND DISTANCE INDICATORS.

An electric contact time clock is connected in circuit with the datum line pens and arranged so that each five-second interval is registered by a notch. As the movement of the record paper is proportional to the distance traveled, these notches in the datum line serve as a means to determine the train speed. The location of mile-posts, stations, bridges, etc., are also recorded

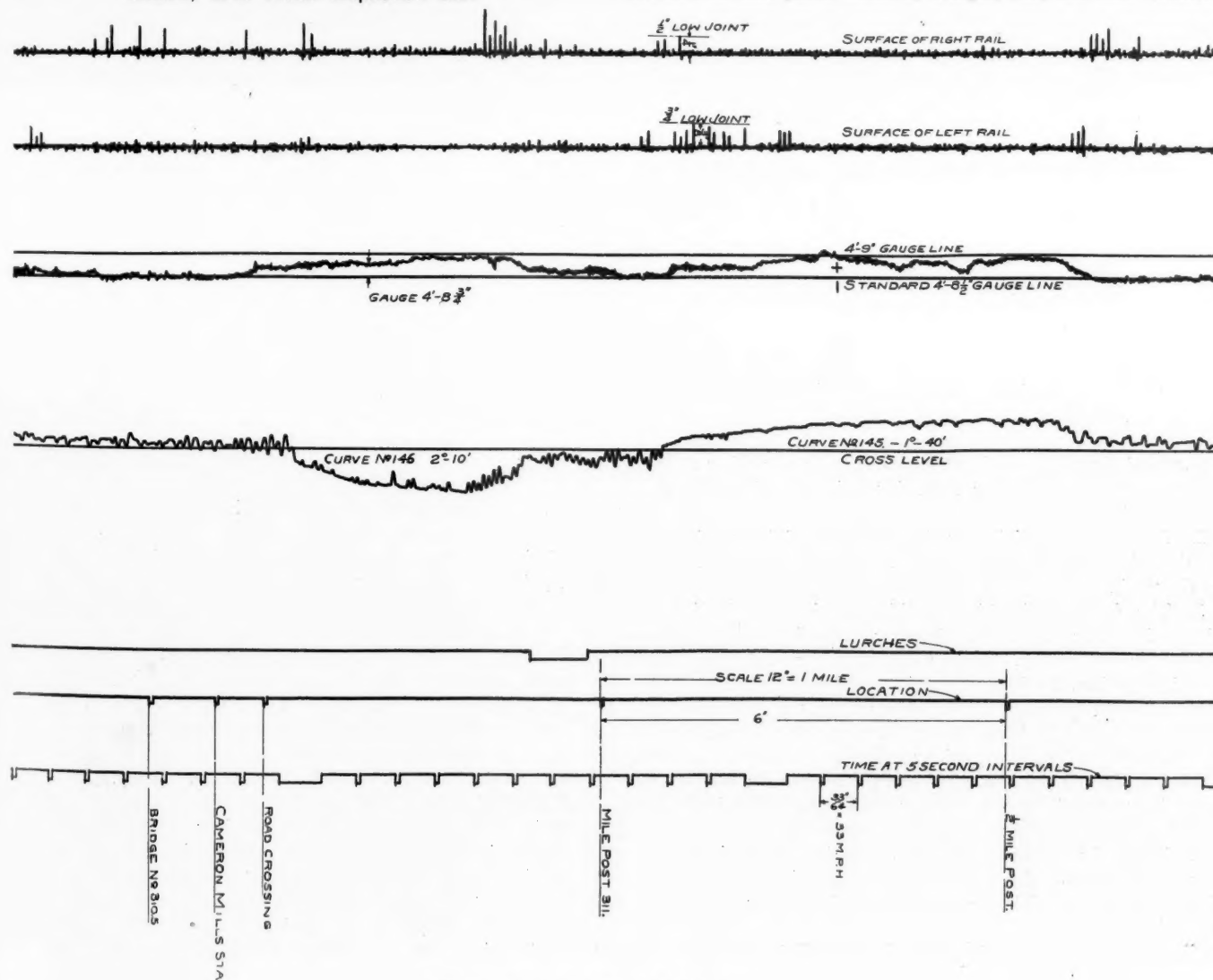


Fig. 7—Part of a Record Diagram.

electrically by an observer, who presses a key as the car passes such points. These indications constitute an accurate method whereby the position of track imperfections can be located, and provide a check upon the operation of the track-spotting device.

Before placing this car in service, the various detecting and recording mechanisms were carefully calibrated, upon a section of specially prepared track. As all the devices are provided, where necessary, with suitable adjustment facilities, it is anticipated that future track inspection work can be performed and accurate records obtained covering a wide range of conditions.

The car and apparatus were completed and put into service in July, 1911, and immediately following that date a complete test of all track on the system was made. A similar inspection was again made in the fall of the year.

In making tests the car is run on the rear of a special train at a regular rate of 35 miles per hour. On the usual run about 350 miles of track is tested in a day. The charts made by the car are blueprinted and copies of their respective sections furnished to the track foreman. Prints are also furnished to the division engineers, and a complete set to the chief engineer of maintenance of way. At the same time reports showing the total and average number of $\frac{3}{8}$ in. and $\frac{5}{8}$ in. or over low joints and carswings per mile for each section and division are made up.

The maintenance of way officials are present on these tests and inspect the general conditions of the track, the division engineers, superintendents and supervisors accompanying them over their respective territories. Following the fall inspection and test, reports are made up and the charts and records are compared with those taken in July.

A system of prizes for the best sections has been established. The track charts, the records of spring and fall inspections, the physical conditions surrounding the work and the expense of maintenance from the basis of making awards.

In the operation of the car it has been found reliable in taking tests from 30 to 40 miles per hour, according to track conditions, but that when a faster rate of speed is reached the cross level and lurch devices are affected by the movement of the car and the centrifugal force when rounding curves so as to give inaccurate results. Therefore, care is taken to calibrate the car for 35 miles per hour and to run as near as possible to that speed.

THE FOREMAN PROBLEM.*

BY P. J. M. WOSLYNG,

Roadmaster, Alberta Railway & Irrigation Co., Lethbridge, Alta.

I would advise the following measures to improve the situation facing us regarding the scarcity of good section foremen:

1. Give the section men a fair and square deal. Let them understand that they are just as important as any other class of railway employees and show them that it is recognized that their service is important.
2. Pay all regular laborers the highest local laborers' wages, so that they will be encouraged to remain and work steady on the track.
3. The foreman should show his men how to do different kinds of work, and explain whenever convenient why it should be done in such a way. When a laborer is far enough advanced, give him a show to do different kinds of track work under the foreman's supervision, and if he does wrong, the foreman should be prompt to rectify him. Before he gets any promotion, move him to some section, in a yard, or extra gang, where some heavy work is going on under a good practical foreman; and let him work long enough to get familiar with heavier work than he would be able to practice on an ordinary section.
4. When the road master calls a meeting of his foremen to discuss track work, the men that are nearest in line for promotion should, if possible, be present and be encouraged to take an active part.

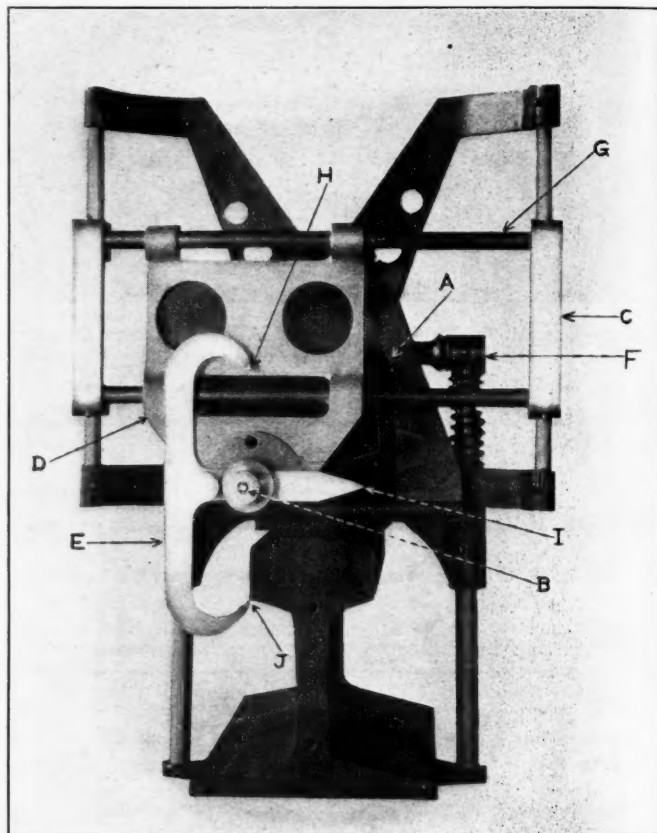
*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

RAIL TRACING MACHINE.

BY J. H. K. SHANNAHAN, JR.

It is of importance to both the railways and the manufacturers to have a quick, accurate method of determining the wear of rails in service, especially on stretches of track where the service is known to be severe. This enables the railway company to make accurate comparisons of the wearing qualities of the rails furnished by the various manufacturers, and it also serves as guide to the manufacturers themselves.

The Maryland Steel Company has had in use for several years a machine which is simple in design, accurate in execution and easily operated. By moving steel tracer points over the surfaces of the head, a facsimile section of the rail is traced simultaneously on a glass plate coated with lampblack ground



Type A Rail Tracer Used by Maryland Steel Company.

in oil. The mechanical arrangement is such that absolute accuracy is guaranteed.

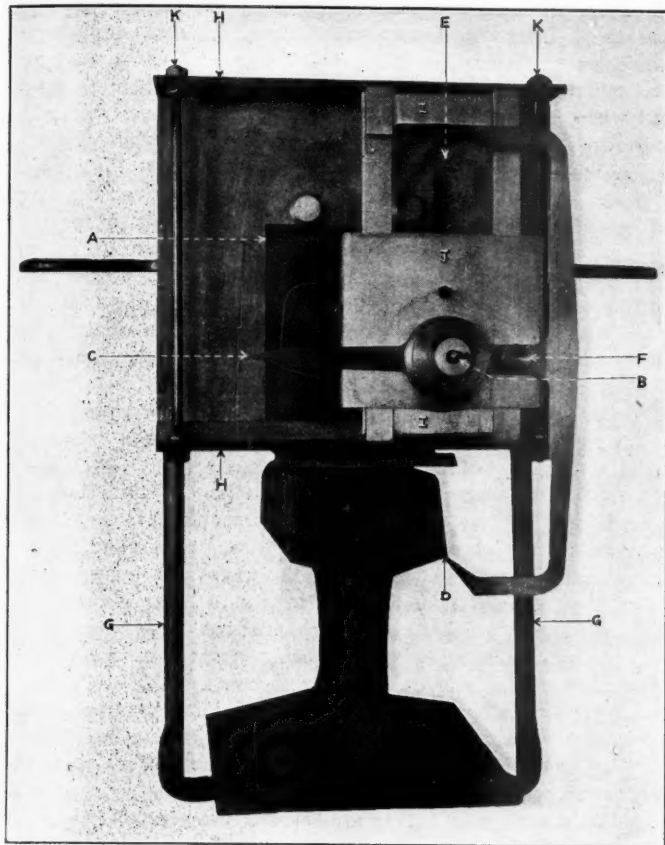
If it is desired, a pencil and pad may be substituted for the steel point and the glass plate, but the latter is preferable, as a blue print may be made from it direct, thus giving the actual section from the original tracing.

If the rail is of a standard section, a templet can be placed over the tracing and the original section laid out, showing the actual amount of wear. By making readings from the same rail at regular intervals, the wear per month or per week may be easily computed in pounds.

Two machines are in use by the steel company. The type "A," shown in the cut, is used for work where especial care is desired. This machine weighs 7 lbs. in working order. The glass plate is shown at "A" and a portion of the section already traced is clearly seen. The tracer "E" has three points, the central one "I" being used for tracing the top and the side prongs "H" and "J" for the under and side furnaces on their respective sides. Irrespective of which of the tracers may be in use, the pencil "B" always follows the outline of the section.

The bearings are all case-hardened and ground and of such length as to make the head "D" rigid, yet its movement along the runway "G" is perfectly smooth.

The type "B" machine operates in precisely the same manner, but is of different and much lighter construction. This



Type B Rail Tracer Used by Maryland Steel Company.

is a distinct advantage when a large number of tracings are to be made over an extended territory, as is frequently the case. This machine weighs about $4\frac{1}{2}$ lbs. in working order and 7 lbs. in its leather case, which is $11\frac{1}{2}$ in. x $9\frac{1}{2}$ in. x 4 in. With a supply of 40 plates in the case the whole outfit weighs but $12\frac{1}{2}$ lbs.

CARING FOR EXTRA GANGS.*

BY G. W. ROBERTS,

Roadmaster, Central of Georgia, Columbus, Ga.

In my experience in the last twenty years in handling extra gangs the best results have been secured by furnishing good living cars, feeding them fairly well and furnishing them beds to sleep on.

I think that the best track foremen should be put in charge of the extra gangs; that is, foremen with smooth temper and fair intelligence, who realize the fact that all of the men he employs are not thoroughly competent to handle the work themselves and need smooth handling to make them valuable in the service.

I have had very little experience with foreign laborers. I have worked colored laborers as a rule, but any laborers handled under the above system should be successful.

We pay colored labor \$1.10 and \$1.25 per day on extra gangs, which is the general practice through this section of the country. The laborers we are able to get for \$1.10 are very inferior. As a rule the laborers that we get for \$1.25 prove very good and make much better time and are a great deal more to be depended on.

*Received in the contest on The Organization of the Extra Gang, which closed April 25, 1912.

TRAINING THE FOREMAN.*

BY C. C. COOK,

Division Engineer, Baltimore & Ohio, Philadelphia, Pa.

The development for men for positions wherein they will be responsible for direction of others and the accomplishment of desirable results must consider two factors; viz., the personality of the man, and the work to be accomplished. In the case of the section foreman, the incompetency of many of those now holding their positions introduces another factor.

The present sources of supply of track laborers and foremen are very diverse, and will continue to be so. Owing to the fact that many of the skilled trades offer opportunities for greater remuneration to men who have ability to develop into excellent section foremen, trackmen are usually drawn from the natives of each particular locality, who are willing to sacrifice more desirable positions in order to remain at home, or from a less intelligent class, usually the negro of the foreigner, whose ability would not command a greater wage than is offered to track laborers.

The solution of the problem of the future supply of track foremen is education. This does not mean simply the education secured by varied experience as a track laborer; but that which is given through proper direction by the officers in charge.

Practically all labor of maintenance may be classified into distinct items, and into individual actions. Most of such items may be measured by standards of time consumed and method pursued. Preliminary investigations for establishment of such standards, and continual study to determine necessary revision thereof in order to meet changing conditions are necessary. The standards relating to time reduce each item of work accomplished to a unit of distance or quantity per man per hour; those relating to method cover organization of force and manner of pursuing each item of work. Such methods as have proven to be most economical are established as standards, printed as instructions, and must be followed exclusively.

The foremen are thus placed in possession of the most desirable practice, and directed to follow it. The trackmen on all sections use the same methods. The laborer who is most apt in acquiring knowledge of the standard methods, and gives evidence of possessing executive ability is designated assistant foreman or leading laborer, and is paid a rate approximately 20 per cent. higher than is given to the other laborers. This increased pay is an inducement to acquire all the knowledge of the details of track work necessary to fit him for the position of foreman, and the constant drill in approved standard practice results in the development of a desirable occupant of that position.

This plan requires that ample and competent supervision be constantly exercised. A supervisor and an assistant supervisor should be in immediate charge of a territory not too extended to prevent them from being in continual touch with the foremen and their work. The assistant supervisors make the studies of standard time and method, confer with their respective supervisors, and, in conjunction with maintenance of way officers on each division, determine upon established standards.

This plan is essentially a study of men and their accomplishment. The importance of having a competent foreman is accentuated; and the method of developing them is progressive, educational, and direct. His maturity is inevitable.

The question is an economic one; a more intelligent class of men might be attracted to the maintenance forces if a general increase in wages were authorized; but the problem of development of section foremen would not be solved. Instruction would still be necessary. It is then only by methodical direction of available labor through the standards above outlined that a desirable supply of foremen will be developed for the future.

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

THE HOBO AS A TRACK LABORER.

The First of a Series of Discussions of the Various
Types of Men Employed in Railway Maintenance Work.

CHARACTERISTICS OF THE HOBO.

BY E. KEOUGH,

Roadmaster, Chicago, Burlington & Quincy, Aurora, Ill.

The class of laborer known as the American hobo is used quite extensively on the heavier maintenance work, such as rail renewals, ballasting, etc., at the present time, especially on the middle western roads. This type differs widely from any other and must be thoroughly understood if the best results are to be secured. It is necessary to provide sleeping quarters, commissary and meals for them. This is usually taken care of by boarding contractors who handle it along with depot eating houses, etc., while the railways provide outfit cars, coal, water and ice.

The efficiency of this class of labor depends on the demand for laborers, the quality of the board furnished, the location and nature of the work and the supervision. In the early spring there is no trouble in securing first-class men, provided there is "free shipment" from the labor center. The best men do not have money to pay for jobs, otherwise they would not be ready for work. With free shipment these good men known as "old-timers" can be readily picked up and no trouble need be expected about their ability to do the work. In the early part of the season they can be called on to do almost any sort of work with good results.

Good substantial food is a big item in holding men, but this also is governed largely by supply and demand. Most railway boarding contractors provide about the same quality of food, and, considering the present prices of provisions, do as well as can be expected. The greatest trouble experienced is when the camp helpers begin drinking or stealing and the camp is allowed to run down before a change is made. Sometimes a dishonest clerk will "peddle" goods and shorten up on the tables. This, however, is being checked closer now than ever before and the amount of stealing is rapidly decreasing.

The location of the work has much to do with this class of laborers. A small percentage of the men move north and south with the seasons, but probably 90 per cent. of the real hobos work in certain definite districts. Genuine hobos do not move about the country as a rule. They are poor travelers, and are usually known as Chicago, Kansas City, or St. Paul men. Many of them can be found at each season in the same section of the country. A small proportion of the early shipments drift along to new work at track laying. These are usually the best men and are attracted by the higher scales of wages paid by contractors, where spikers, tong men, etc., are generally paid more than those engaged in less strenuous work. Stone ballast work is invariably shunned by this class of men. They also avoid work in swamps, handling coal and cinders, and other more or less disagreeable employment.

On account of the vast experience that men gain by going from one job to another, many of them are liable to have a better knowledge of track work than the foreman in charge. This is especially true of the details of new kinds of switches, tie plates, rail anchors, etc. Unless a foreman has had previous experience with hobos he will get no benefit from their knowledge, but will be left entirely alone to figure out his problems, and a foreman is soon well known by these men; in fact, long before he has a chance to know them. If he is familiar with this class of labor he can usually pick out the "right man" for different kinds of work by inspection. Foremen frequently make the mistake of asking for a certain number of spikers, tong men, etc., instead of pointing out the men they want. In hot weather especially there will be no volunteers for the hardest jobs, although the men will take hold if asked individually.

The foremen are classed by the hobos in three groups: The good foreman will be one who understands thoroughly every

phase of the work and who handles his men in a systematic manner. The foreman known as a "bawler" is a man who understands his work very well, but does an unnecessary amount of loud talking. This class of foremen have trouble holding good men when labor gets a little scarce. Another type of foreman is known to the hobo as the "scissor bill." This class of foremen is wholly inexperienced in handling hobo labor. As a rule, such a foreman is looked down on by the men, although they are apt to pick his gang out for a "summer home" during the hot weather, in order to "get by" easy until cooler weather when they can get along with any foreman. Such foremen often use extra precautions to keep on the good side of the men, and it is here that they make a mistake. No genuine hobo wants to be addressed "Come boys," which is the general expression used when working native or local labor. Experienced foremen call the hobos "men," and, while they are not necessarily rough, they do not pick their language nor use extra precautions to get along with the men, as do the inexperienced ones.

While wages enter largely in the handling of this class of men, this is by no means the most important factor. The majority do not intend to make over \$10 on a job, and, therefore, it is an advantage not to have the wages too high, as with lower wages it will take the men longer to make their stake. Hobos generally are known to each other as "long" or "short stake" men, the long stake ones being termed "stockholders." When men are ready to leave a gang they invariably have a good excuse prepared if the foreman should ask for it. An experienced foreman, however, will not ask for it, but will have their time made up promptly; in fact, hobo time checks should be expedited in order to get the men away without delay. They will go back to work again as soon as they are "broke," but generally to some other gang.

In summing up, the chief advantage of this class of labor is the knowledge of the English language, familiarity with the various kinds of work, fewer delays from conversation in the gang, less trouble than with foreigners in suburban districts as they are perfectly harmless and stay close to the cars while the foreigners are usually trading, stealing and causing trouble. There is also less liability of graft or stealing by foremen, time-keepers and others as is so often the case with foreigners. The chief disadvantages with the hobos are their irregularity of service, the necessity for housing and boarding the men, their refusal to work in stone ballast or other work not to their liking, and their refusal to work Sundays or overtime unless paid an extra rate, in which case invariably they lay off on Monday.

To successfully handle hobo work the men should be provided with the best outfit cars and good, substantial board; time checks should be issued and paid promptly, and good, experienced foremen should be provided.

THE ABILITY OF THE HOBO.

BY E. R. LEWIS,

Division Engineer, Michigan Central, Bay City, Mich.

As an extra gang laborer in American railway service the hobo's capabilities are indisputable. His inclination to work is more uncertain. That he requires strict discipline has been repeatedly proved, for there is little of the childlike simplicity of a foreign laborer about the hobo. He is a man of the world and is furthermore a traveled personage, schooled in all the tricks of living on his wits.

A foreman who attempts to manage a hobo gang must be thoroughly experienced and when occasion demands must be able to use aggressive tactics. Absolute justice, fearlessness, and faultless judgment are necessary to the foreman, for he is dealing with men who know men, and whose appreciation of mastership is quick and keen.

The hobo has little to learn about track work. He is familiar with all branches of a railway, from the train service to the detective department. Moreover he is well used to doing various kinds of work, being a jack of all trades in a vagrant way. There is a self reliance, a "cammaraderie," a reckless independence, and a cheerful acceptance of circumstances about a gang of hobos that appeals to the experienced railroad man, and that warms the heart of a first class foreman, who knows hobo ways. It likewise often chills the blood of the tenderfoot. There is a rough loyalty about these tramping railway laborers which is remarkable. There is a pride among them in their work, similar to that of every free born American citizen. European laborers are usually "quitters" in emergencies. Not so with the hobo. Emergencies are his delight. A car off the track, a washout, or a track torn up furnish a zest to the work and an incentive to extraordinary effort. There is life and reserve energy in a gang of hobos that it is difficult to detect among other classes of railway laborers.

While the hobo has his preferences, as evidenced by certain chalk marks on gates of fences surrounding the houses which shelter the best and most generous cooks of the towns he frequents—he is also inured to hardships and disappointment. He will cheerfully accept such food as is furnished him till he can do better. But to hold a hobo gang, clean, plain food must be furnished in abundance. Box cars fitted with board bunks serve well as lodgings.

Definite organization is the greatest money saver with a hobo gang. Pick a man for certain work. Keep him at it. If possible work him against a comrade, or work one gang against another at similar tasks. The friendly rivalry created is a pleasure to the men and a profit to all concerned. The rivalry one can create between two gangs of European laborers is usually tamer than a chicken fight.

Payday is the hobo's Waterloo. Too often the hard earned monthly wage, minus the board and van account, is spent in one glorious week-end spree, while the foreman waits or struggles on with a few weaklings or new men, but without the old hands whom he has worked so carefully to organize into a quickly responding human machine. In two or three days a large percentage of the men may return. If a nucleus can be retained the matter is not so serious. The hobo seldom strikes. If he does not get what he considers his rights, he leaves; usually without comment.

Complaints are always heard from foremen used to handling hobos when they are put in charge of gangs of foreign laborers. There are often interpreters who are trouble breeders. There is a mutual distrust between the foreman and men—largely due, as are most misunderstandings, to ignorance on both sides. Many of the men never have seen railway tools or materials, nor will they spread out and work singly as hobos will. There is continual trouble to avoid bunching, and jabbering to the detriment of the work in hand.

The hobo will often soldier if he can, as will every other laborer at times. But the hobo can be reasoned with. He is an intelligent, independent working unit. Each man is a real American man, full of comprehension, guile and a certain amount of energy. He will work when he is supposed to, if reasonably supervised. The European laborer, however, endures idleness better than the hobo. He is content to cook his food and idle about in his bunk cars while the rain pours down and the work is shut down. A stranger in a strange land, he is naturally clannish, staying with his comrades who come from his own old country district, who speak his dialect and understand his ways and modes of living.

The hobo idles as he works, independently. Idleness in a railway camp is far from his notion of happiness. He overeats, fights, drinks if possible, and becomes generally demoralized in spite of discipline. I have seen a first class track laying gang utterly routed after a week's enforced idleness. While he works the hobo is unsurpassed as a trackman. Well handled, he is good for say five months' work a year. The steam shovel has

partly put him out of the railway business, but gangs are still to be found and where they can be secured they are still more in favor with railway employers than any other class of labor.

GOOD BOARD ESSENTIAL IN HOBO CAMPS.

BY F. E. CRABBS,

Roadmaster, Chicago & North Western, Chicago, Ill.

Hobos will not accept work as regular track laborers. They are much better when used in extra gangs laying rail and track, but are a very unreliable class of men, their length of service averaging from three days to six weeks, depending largely upon the time of the month they go to work and the interval intervening since pay-day. With a gang of 50 or more one can figure on from one-half to two-thirds leaving at pay-day, unless he maintains an exceptionally good boarding camp and the wages are standard when he can expect the larger part of the gang to remain. The railways are, however, depending less and less upon this class of labor owing to their uncertainty in service and are giving the preference to the foreign class.

My experience as an extra gang foreman has been that the foreman who allows the commissary company to provide him with good board and who never takes the interest to make a personal inspection of the board that is being furnished his men will not be able to hold them. I made it a rule to inspect each table at least twice a week to satisfy myself that the board was all they could expect. I also made it a rule never to accept any kicks on board on the work but only at the table and always took the clerk of the camp with me. In doing this I always was able to maintain a first class camp and was able to hold the men most of the season. The fact that poor board has been furnished is what has driven the hobo away to a great extent and the reason that the poor board has been furnished has been due largely to lack of competition in this line. The railways are now getting competition and it will improve the length of the service of the so-called hobo laborer.

For relaying rail, track laying or putting in switches the hobo is preferred owing to his intelligence, but the foreigner is more preferable for ballasting, ditching or other work owing to his staying qualities. Outside of camp conditions the staying qualities of the hobo depend largely upon the organization of a gang. If a foreman does not know how to organize a gang he will not be able to hold the men. There are no laborers who will detect a foreman's organizing ability more quickly than the hobo, who will not stay with a poor foreman but will go on to the next gang, advertising the fact.

A foreman should never try to drive his men but to study their physical conditions and know what each man should accomplish. If there are any men in the gang who are not physically able to do a day's work get rid of them. The foreman should let the men know that he is boss but should never abuse a laborer. If he gets the good will of the men they will need no driving, but will drive themselves when he is in a pinch.

FROM WATERBOY TO FOREMAN.*

BY D. F. HARVEY,

Supervisor, Pittsburgh & Lake Erie, Beaver Falls, Pa.

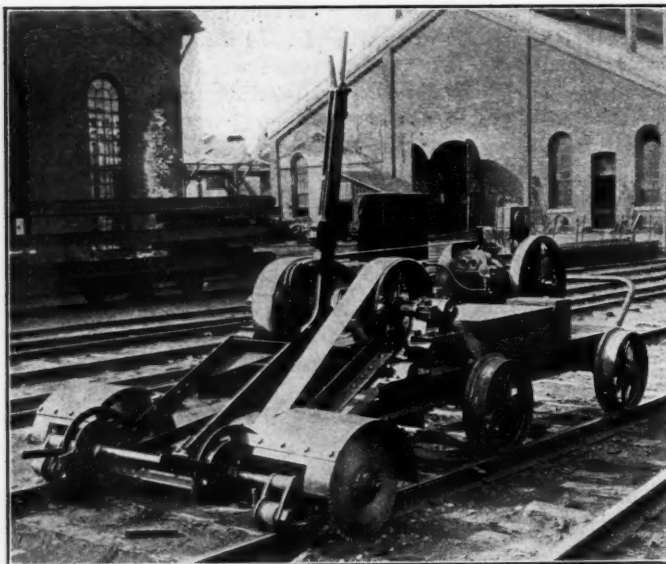
Each spring I usually receive applications from a number of school boys, 16 to 18 years old, who want to work during the summer vacation. From these applications, we select as many boys of good character and habits as we need for water-boys for the extra gangs. After carrying water for one or two seasons, they have a fair idea of the duties of a foreman, and the ones who wish to follow track work are assigned to work as sub-foremen, under the best foremen we have. In this way we have each year a number of sub-foremen who can take charge of extra gangs at any time. At present I have eight extra gangs, and with five of these gangs I have young American sub-foremen

*Received in the contest on The Section Foreman Problem, which closed March 23, 1912.

who are capable of taking charge of extra gangs at any time. Some of these sub-foremen are graduates of local high schools. My motto is, "Make your own foremen."

A NEW TIE SCARFING MACHINE.

The accompanying view shows a new device for scoring ties which has recently been developed and is now being used on the Illinois district of the Chicago, Burlington & Quincy. It consists essentially of four 18 in. circular saws mounted on a frame which is pivoted to the front end of a push car, on which is placed a 20 h. p. gasoline engine. The saws are placed one on each side of each rail and are spaced as desired by means of suitable filler washers on the saw arbor. The depth to which the saws cut is regulated as desired by raising and lowering this arbor, while their lateral position with reference to the rail is maintained fixed by small flanged guide wheels placed in advance of the saws. The driving is belt connected to the engine, which furnishes power exclusively for the saws, as the car itself is not self-propelling. The framework supporting the saws is pivoted to the front end of the car and can be raised clear of the track when not in service. The push car is very similar to the ordinary car, except that it is built somewhat heavier and has a projection on the front end. When sawing, the car is pushed along the tracks by two or three men, while



Tie Scarfing Machine.

one man is required on the car to operate the engine. While the car is balanced so that it can be taken off the track readily at road crossings, it cannot be lifted bodily from the track by the four men, and must be protected by flagmen when working. When operating, the car is pushed along the track, sawing the ties to the required depth, the saws being spaced $11\frac{1}{2}$ in. center to center over each rail, at the time these observations were taken. Because of the interference of the ballast with the saws it has been found advisable to clean the ballast away for about an inch below the base of the rail in advance of the car. The best speed made so far has been one mile of ties sawed in three hours, although this will probably be exceeded as the operator becomes more experienced. Three sets of saws are required per mile, although this depends somewhat on the kind of ballast in the track. It requires about five minutes to replace a set of saws. About three gallons of gasoline and one-half of a gallon of valve oil are required per mile of ties sawed.

By sawing the ties even with the base of rail, as is done here, the scoring of the ties in advance of the rail gang is eliminated and the amount of adzing necessary after the old

rail is thrown out is decreased, so that it is found that four men working with the rail gang can do the adzing necessary. This compares with from eight to twelve men adzing with the ordinary rail gang, laying perhaps one-half mile of track daily. However, this saving in labor is not as important as saving in ties and the securing of more uniform adzing. With this machine the ties are sawed only to the base of the rail and the adzers have this guide to follow instead of adzing practically the same amount for each tie as is generally done. Furthermore, this sawing furnishes a more uniform bearing for the rail, not only by insuring that the tie is adzed level, but also that all are adzed to the same height. This car was designed and developed under the personal direction of A. W. Newton, inspector of permanent way and structures of the Chicago, Burlington & Quincy, and was built in the Aurora shops of the Burlington.

SOUTHERN PACIFIC MEDALS FOR TRACK MAINTENANCE.

The practice of the Southern Pacific in awarding medals to roadmasters, section foremen, station agents, pumpers and power plant engineers, on the results of an annual inspection is similar to that in use on the Union Pacific, which was mentioned in an article on Prize Systems in Track Work in the *Railway Age Gazette* of February 16. The last inspection on the Pacific system of the Southern Pacific was made between November 21, 1911, and January 6, 1912, a complete report of which has recently been issued in pamphlet form. The inspection of track on each section is based on a grade of 100 for perfect, 25 points being allowed for alinement, surface and gage; 25 for spiking, ties, lining and spacing, switches and frogs; 20 for drainage and ballast; 10 for material, condition of grass and weeds, and right of way; 10 for section houses and grounds; 5 for sidings, and 5 for fences, road crossings and run-offs. The foreman of the section having the highest percentage on the system is awarded a gold medal, and the roadmaster of the district on which the average of the percentages for all sections is the highest also receives a gold medal. At the last inspection these medals were awarded to M. Lahey, roadmaster on the Salinas district of the Coast division, and J. J. Silva, foreman of section No. 17 on the Salinas district. A silver medal is awarded to all foremen having the highest average for their respective roadmasters' districts. The inspection also covers the stations, pump houses, fuel oil plants and power plants, these buildings being graded on a basis of 10 as perfect. Silver medals are awarded all station agents, pumpers and engineers in charge of buildings receiving a perfect grade. Out of 637 stations on the system, 27 were perfect. There were also 21 perfect pump houses, 3 perfect fuel oil plants and 6 perfect power plants. The inspection was made under the direction of J. Q. Barlow, assistant chief engineer, the other members of the party consisting of district engineers, division engineers and assistant division superintendents, these men inspecting lines over which they had no jurisdiction. The inspection train covered a mileage of 9,655 miles, the inspection being made on 6,481 miles.

In 1900, 4,406 yellow pine ties which had not been tapped for turpentine were installed with 660 oak ties in the westbound passenger track on the Barree tangent east of Tyrone, Pa., on the main line of the Pennsylvania Railroad. Eleven per cent. of the pine ties were removed in 1908, 15 per cent. in 1910, and 21 per cent. in 1911, or 47 per cent. in all up to February, 1912, while all but 2 per cent. of the oak ties had been removed by 1908. This would indicate the great advantage for tie purposes of not tapping the pine for turpentine, and shows a greatly increased life of the yellow pine tie which has not been tapped over one which has been tapped, or over the oak.

TIE DISTRIBUTION AND RENEWAL RECORDS.

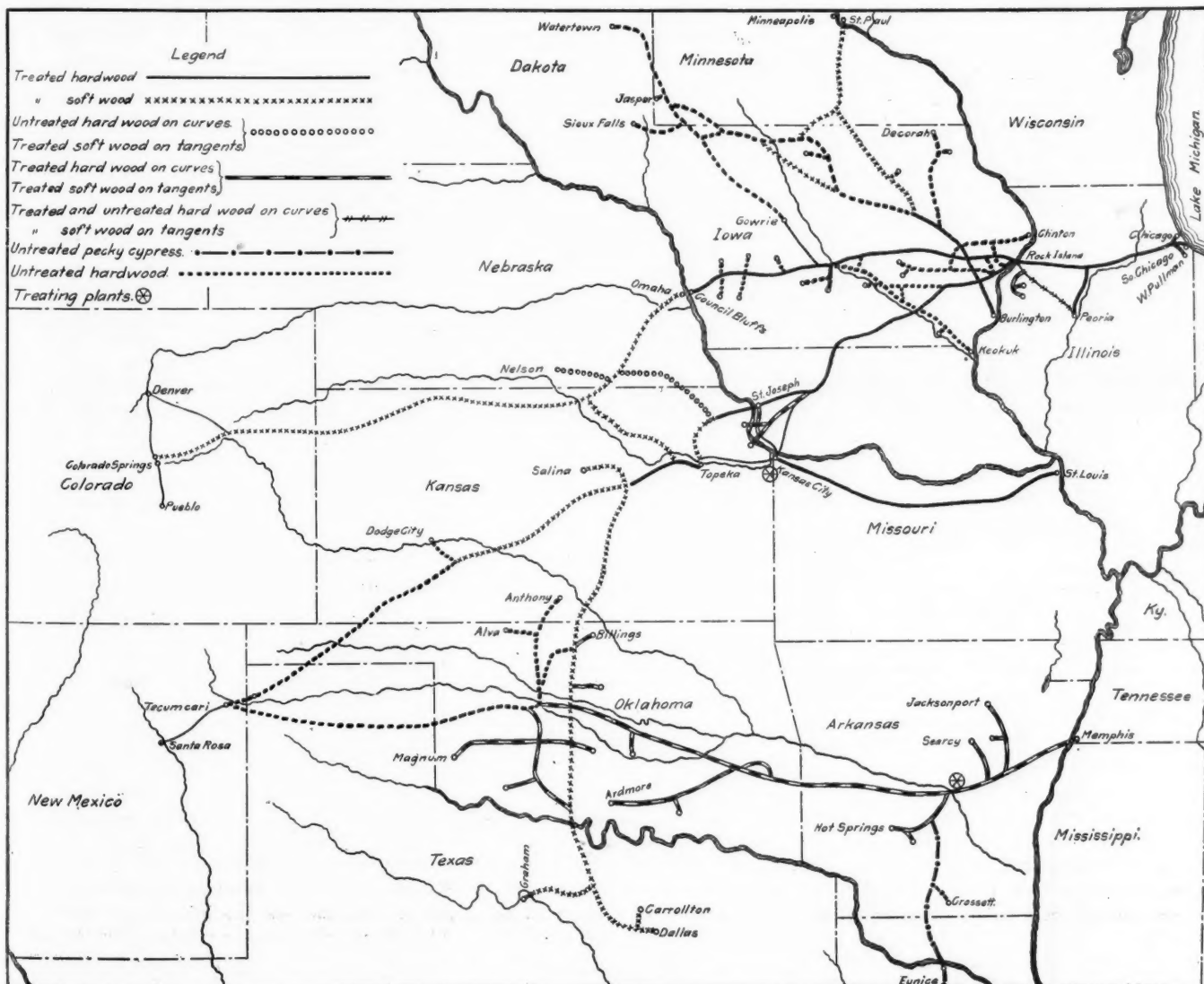
Description of the Methods Used on the Rock Island in Making Allotments for the Season's Requirements, with Forms Used.

The distribution of the various grades of ties—hard wood and soft wood, treated and untreated—over a large railway system so that each grade will give the most economical service, and the keeping of accurate and complete tie renewal records to eliminate waste and double haul on ties supplied in excess of requirements, can be made to effect a considerable saving in this branch of maintenance. The engineering department of the Rock Island has made a careful study of this problem and has in operation a very satisfactory program of distribution and system of records.

The decision to use a given class on a given division should depend on the climate, the traffic, the weight of rail, depth and kind of ballast, the use of tie-plates and fastenings and the location of the line with reference to the tie supply. These factors have all been considered in deciding on the standard distribution indicated on the accompanying map, which is changed as variations in one or more of the above conditions make it necessary. This company's tie supply is derived almost entirely from the Missouri and Arkansas timber district and the treated ties are treated at the American Creosoting Company's plant at Kansas City, Mo., and the Ayer & Lord Tie Company's plant at Argenta, Ark. As indicated on the map, treated hard wood ties with tie-plates are used on the main lines of heaviest traffic in Illinois, Iowa, Missouri and Kansas and treated soft wood ties

with tie plates are used extensively over the whole system for lines of moderate traffic. The available supply of untreated hard wood, oak and cypress, is used on lines where experience shows that this wood will give the maximum service, but it is likely that the use of treated pines and other soft woods will soon have to be further extended on divisions now receiving untreated white oak on account of the increasing scarcity of that timber. A considerable mileage in the southern states which is subject to a heavy traffic uses treated hard wood on curves and treated soft wood on tangents. The use of untreated pecky cypress on one branch line in the South has been found to be very satisfactory, and owing to the fact that a supply of that wood was available in the territory reached by that line, such ties are more economical than treated ties.

The assignment of ties is based on estimates made by roadmasters which are classified in the general office by superintendents' divisions. Each roadmaster is furnished a book of printed forms for making detailed estimates, which he retains as a guide in assigning ties to the foremen. It also shows the number of each size of switch tie required with the name of the siding where they are needed. The roadmasters are required to personally inspect and mark all switch ties to be removed and no renewals are made except on the roadmaster's order. The road-



Map of Rock Island System, Showing Class of Cross Ties Used.

master copies the estimate for track ties from this book to a standard form showing ties required on main and side tracks by miles and sections. These estimates are checked over when received in the office of the supervisor of the tie and timber department, and all unusually high estimates are made the subject of special investigations. The roadmaster's estimate of switch ties is sent in on a blank which classifies all pieces of each of the standard sizes showing the station where they will be used. The track tie estimates totaled by superintendents' divisions are entered in a large form which also shows the mileage of main and

Statement of Ties Placed in Track for Period Ending June 7, 1911								
Division	Assignment	Ties Furn. 8-1-11	Total Placed in Track				Balance to place in track	Ties on Hand 8-1-11
			During Week	During Month	Total to Date	Per Cent		

Weekly Tie Report.

side tracks and the number of ties used previous years on each division. By comparing these figures and allowing for the local conditions which are known to affect the problem, an assignment can be made in the general office which will come very close to the actual requirements of the track.

It has been the policy of the company for some years to have at least 50 per cent. of the ties required for the season on hand by January 1 and to begin distributing them as opportunity offers so that the assignment may be on the ground by June 1. Shipments are made from the treating plants whenever cars and engines can be furnished, as an immediate shipment eliminates

FORM M. W. 25 LOCAL
DIV. _____ LINE OR BRANCH _____
FROM M. P. _____ TO M. P. _____

From T. P.	To T. P.	No. Ties Tangent	No. Ties Curve	SWITCH TIES		NAME OF SIDING
				LGH.	PCS.	
				8'-0"		
				8'-6"		
				9'-0"		

Tie Estimate Form Filled in by Roadmaster.

handling into and out of storage piles, reduces the space necessary for such storage piles and the risk incident to keeping a large number of ties in one place. There is a great advantage in supplying the ties to foremen before the spring work starts as the men can then space them along the track approximately as they will be needed without interfering with other work and thereby save themselves considerable time when the renewals are being made. Every foreman reports four times a month to the superin-

tendent the number of ties, treated and untreated, which have been placed in main and side tracks since the last report, and this information for each division is reported by the superintendents to the tie and timber department at the same intervals. These reports are made by wire and a letter code is used to indicate whether ties are treated or untreated and whether they are placed in main or side tracks. Monthly reports are mailed in to the general office by roadmasters showing the number of ties received to date on the assignment and the number of each kind used for renewals and new tracks. From these weekly and monthly reports statements covering the whole system are prepared. The weekly statement shows the assignment, number of ties furnished and number placed in track that week, that month, and total to date; also the balance on hand and the number yet to place. The monthly statement divides the information to show separately the treated and untreated ties and number used in main and side tracks, and the number of each kind used for new tracks. The monthly report is cumulative so that at the end of the year the annual statement is ready without additional work. Summarized statements covering a term of years are also

RM 10-11

Form 1246 Local

Estimate of track ties required for maintenance of tracks in

1911 on the _____ Division

LINE	SECTION NUMBER	ON MILE	TIES REQUIRED			
			MAIN TRACKS		SIDE TRACKS	
			TANGENT	CURVE	TANGENT	CURVE

Form for Reporting Tie Estimate to General Office.

kept up—one showing all treated ties used, divided between main and side tracks, with the mileage and total number of ties in track; and another, the total number of all ties, both treated and untreated, placed in the track each year. These statements show a number of interesting things about the company's policy in the use of ties. In the four years ending in 1911 treated ties were placed in the main track of every division on the road, the percentage of treated ties to the total ties in the track varying from 6 to 53 with an average for the whole system of 29. Treated ties have also been used in side tracks on every division but one, the percentage of such ties reaching a maximum of 55 on one division and an average of 21 for the system. The total renewals per mile for the last five years is shown as follows: 1907, 201; 1908, 286; 1909, 275; 1910, 245; 1911, 255.

This system of tie records has been worked out under the direction of J. B. Berry, chief engineer, and C. F. Ford, supervisor of timber and tie department, to whom we are indebted for assistance in securing the above information.

Proposed Tie Assignment 1912

Division	Mileage			Used 1911		Superintendent's Estimate				Proposed Estimate					
	Main Tracks	Side Tracks	Total	Number Ties	Per Mile	Main Tracks	Per Mile	Side Tracks	Per Mile	Main Tracks	Per Mile	Side Tracks	Per Mile	Total Ties	Per Mile

Form for Preparing Tie Assignment.

Division	Assignment	Furn. on Assignment July 1, 1911	Main Track Renewals			Side Track Renewals			Total ties placed to dated	Balance to place	Ties used in new tracks	
			Total placed in track			Total placed in track					Treated	Untreated
			Treated	Untreated	Total	Treated	Untreated	Total				

Monthly Tie Report.

THE FUTURE SUPPLY OF SECTION FOREMEN.*

BY P. J. M'ANDREWS,

Roadmaster, Chicago & North Western, Belle Plaine, Iowa.

An essential part of successful railway management is to secure the greatest possible efficiency from the expenditure for track material and labor, hence the importance of proper supervision of the labor employed, as well as of the use of material. As track foremen are in most immediate charge of track maintenance, and it is necessary to recruit supervisors and roadmasters from the foremen, it is important that these men be high grade, intellectually and physically. Up to the present few companies have anticipated the scarcity of foremen or made provision to guard against such a condition, the matter being left largely in the hands of the roadmasters.

The decline in the quality of foremen is not entirely the result of wages paid to laborers, although no doubt that is a contributing cause. In agricultural districts the farmers, contractors and municipalities control a large percentage of the local labor, and a higher rate of wages will always be paid by such employers, than by the railways, resulting in the latter being compelled to employ the inferior local labor and such foreign laborers as may be secured from the commercial centers. Were the railways in the agricultural districts to increase the rate paid unskilled labor, their competitors for the local labor would immediately outbid them and the situation would remain unchanged. The situation is a natural consequence of the rapid development of the western part of our country and not the result of mismanagement.

It is apparent, therefore, that the solution of the problem must be sought elsewhere than through a raise in wages paid to laborers. In the opinion of the writer this may be brought about by an evolution in the organization of track forces, such as a combining of duties now assigned to track foremen, signal maintainers, etc., a possible extension of the average length of sections and other economies that will enable the companies to pay a higher rate to the foreman without increasing the charge for track maintenance.

We have recently been shown through the *Railway Age Gazette* that considerable saving has been made by adopting the motor car for section use on some lines. If a portion of such saving were applied in an increased wage to the foremen remaining, it would serve as an inducement for desirable men to take up track work and fit themselves for the position of foreman. It has been demonstrated that a combination of track and signal maintenance duties can be taken care of by one individual, so that in automatic signal districts the work of the foreman can be made more attractive than formerly, which will aid in securing men.

Through the agricultural districts it is now a rare occurrence to find young, active and intelligent Americans engaged as track laborers. We are therefore compelled to seek the future foreman among the foreign laborers. This task is not an impossible one, however, as there are at present a large number of very good foreign track foremen who have been educated to their work. Our plan is to observe the laborers, and when a man is noticed who takes an interest in the work, we endeavor to furnish him employment throughout the year and by gradually extending his responsibilities we learn whether he is suitable timber for a foreman. Such a student must be able to read and write the English language, and of course speak it well enough to be readily understood. After a period as laborer, we appoint him assistant foreman with some experienced man, who we know will take an interest in teaching him the best methods of accomplishing various kinds of work, and as soon as opportunity offers we give the student a small crew of men, usually of his own nationality, and move him about on the different sections to assist where required in surfacing, ditching, laying small amounts of rail or putting in switches, thus giving our student a varied experience

on the work as well as with different foremen. We have found that the student will pattern after the foreman who has the best and quickest methods. While the student is in charge of this small floating gang, he is required to work under the direction of the section foreman with whom he may be, but is required to do as much of the actual work of foreman as his experience may fit him for. He should not be confined during his experience to yard work, but must be kept for a while on the outlying sections as well.

The period as a student can only be determined by the aptness and natural ability of the individual, but should be extended enough to give him an opportunity to spend some time at the various kinds of work. On divisions where there are branches or side lines we prefer to give our student his first real trial as foreman on the line where the work is the least important, and if he shows fitness, he is then advanced to a more important section with the usual slight increase in salary over the branch fine rate. During the period they are employed as student foremen they may be taught how the various reports are made out, and under the supervision of the section foremen ought to be allowed to make up their own time books and distribution of labor while with the floating gangs.

A CORRECTION.

The paper which was awarded first prize in the contest on The Organization of the Extra Gang, and which was printed on page 1103 of the issue of the *Railway Age Gazette* of May 17, should have been credited to A. Palm, roadmaster of the Western Pacific Railway, instead of A. Palmer.

EFFICIENT OPERATION OF AN EXTRA GANG.*

BY P. H. HAMILTON,

St. Louis & San Francisco, Pittsburg, Kan.

Proper organization, a good foreman, a good class of labor, and plenty of good tools are the four main factors in securing efficiency in an extra gang.

The aim of the average extra gang foreman is simply to keep the men moving, and as long as they are busy he considers it an efficient gang. The foreman should organize the work and should have a definite understanding with each man as to what he expects of him. He should be able to keep his men "strung out" so that each can do a full day's work. Foreigners, especially, are inclined to bunch up and turn the day's work into a "talkfest." The men should each have a certain work to perform each day and should be developed along that line. For instance, the men in a rail gang are not all good spikers. The foreman should pick the best spikers and keep them busy. To keep a good bunch of spikers the foreman should be allowed to pay them 10 or 15 cents per day more than the other laborers, this being the most trying work on a rail-laying job. He should have certain men assigned to the tongs, etc.

I do not believe in large gangs for any kind of track work unless it is common pick and shovel work where the foreman has only to walk up and down his line of men to keep them busy. I have noticed that the larger the gang under one man's supervision the less the amount of work per man. No extra gang should exceed 35 men, as this is all that one foreman and an assistant foreman can handle profitably. Two surfacing gangs of 35 men, each with a foreman, assistant foreman and timekeeper, will do work much cheaper per track foot than a gang of 70 men with one foreman, two assistant foremen and a timekeeper.

There are three chances to increase the efficiency of a gang—the timekeeper and the two flagmen. The timekeeper should be a young man who wishes to learn track work and who will try to act as assistant foreman. The flagmen generally have a

*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

*Received in the contest on The Organization of the Extra Gang, which closed April 25, 1912.

monotonous job which on a warm day is very conducive to drowsiness. On a rail gang the front flagmen can do good work putting the joints on rails, with two bolts in place, ready for "heeling in"; or he can score ties for adzing. The rear flagman can find plenty of work tightening bolts. On a surfacing gang the head flagman can make jack holes, etc., and the rear flagman can make himself useful dressing up track. This work keeps them wide awake and they are always on the alert for approaching trains.

The roadmaster and foreman should decide how each man should do his part of the work and should instruct him to do it that way. While instructing the men the progress will probably be a little slower; but in a short time the foreman will have the men working in unison and doing the work according to his system, which means the highest efficiency obtainable.

A green section foreman rarely makes a good extra gang foreman at first, but by giving him an assistant foremanship under a good extra gang foreman, and giving him personal instruction, the roadmaster can usually develop him into a good foreman. On this road outsiders are never hired for extra gang foremanships unless in emergency. Foremen are taken from the sections and developed; when their gangs are laid off they are again given charge of their regular sections, enabling the roadmaster to keep extra gang foremen at hand who understand the working conditions on the division.

On this road we work five classes: American whites, American negroes, Greeks, Italians and Mexicans. For all classes of work the Americans are the best, but a full gang is hard to obtain at current wages. For steel gangs I consider negroes far superior to any other laborers. They are active, strong and intelligent; and will work in unity. The "unison man" is ever present and is a strong factor in speeding the work and in keeping down the number of minor injuries to the men. In handling heavy material foreigners are not prone to move together, and this results in numerous personal injuries which could be prevented. The "unison man" should be present in every gang where there is danger of pinched fingers, mashed toes, etc. Of the foreign labor I consider Italians far superior for rail gangs. The Italians, Greeks and Mexicans stand about on a par for surfacing work. The Mexican is far superior when it comes to dressing track.

The Greek and Italian can always be depended upon in time of need, and the foreman can always figure on a full gang, as they hardly ever lose a day unless compelled to. But with the Mexican it is different. As long as he has a dollar he does not care whether he works or not, and the foreman is generally short handed for several days after pay day. One foreman who was an adept at card playing used to keep the Mexicans' finances in bad condition, and in this way he kept a full gang. The strong point in favor of the Mexican for extra gang labor is that they are not as clannish as the Greeks and Italians. Any time that a foreman wishes to weed out his gang he can do so without fear of losing the men that he wishes to keep. It has been my experience with Greeks and Italians that when the foreman discharges a drone he can also figure on losing every relative of this man.

Good tools should always be at hand. Where the supply of tools is limited the foreman should carry a forge and anvil for repair work. Poor tools, such as chipped spike mauls, worn-out shovels, dull adzes and dull track chisels are time losers. The foreman should see that the men take proper care of the tools. In large gangs the men are apt to leave tools scattered along the track, and it is sometimes expedient to have a "tool man" to look after these, put handles in mauls, grind adzes, sharpen track chisels and repair other tools.

On one division where shovels were continually being lost and broken, and the extra gang foremen were ordering large numbers of shovels without being able to turn in the old ones, the roadmaster issued an order that each man should have his own shovel, and any time that he appeared on the work without it he would be sent to the bunk cars until he showed up with one. This soon did away with the scarcity of shovels.

CHICAGO, MILWAUKEE & ST. PAUL RAIL MILL.

The Chicago, Milwaukee & St. Paul operates a rail mill and storage yard at Savanna, Ill., to which all rail and fastenings removed from track are sent when released and from which second-hand rail and fastenings are shipped to various portions of the system as required. For several years previous to 1890 a portable rail saw was located at Watertown, Wis., but on this date a permanent plant was established at Savanna. As this mill was operated it was found that work could be done here more economically than at Watertown and in 1894 the latter plant was closed. Since that time all rails have been sent to Savanna not only from the St. Paul lines proper, but since the construction of the Chicago, Milwaukee & Puget Sound, from this line as well. A variety of work has been undertaken at this mill in addition to the straightening and sawing of rail until at the present time all tracks fastenings, including tie plates and angle bars are sent here to be reclaimed and surplus rail from the system is stored here until needed. This plant has developed to keep pace with the work until it is one of the largest mills in the country operated by a railway company for the recovery and storage of second-hand track material.

Most rail is commonly removed from track because of the



Chicago, Milwaukee & St. Paul Rail Yard, at Savanna, Ill.; Rail Mill in Background.

wearing away of the head on curves and the battering of the ends. By sawing off and redrilling these battered ends, much of this rail is suitable for further service in main lines, or at least in heavy freight or side tracks. All rails and fastenings are shipped to Savanna as soon as released from the track and are there sorted and worked over. If suitable only for scrap the material is placed on stock piles awaiting orders for shipment. If suitable for further use, it is passed through the rail mill, where it is sawed, straightened and redrilled and sent out to be used in the track again.

As this rail comes in it is unloaded directly on to skids leading to the saws. Before reaching these saws it is passed through a hydraulic gag press or straightening machine, where kinks and bends are removed. It then passes directly to the saws, of which there are two. These saws are circular and are spaced 31 ft. between faces so that one foot can be removed from each end of a standard 33-ft. rail at one operation. On rails of other lengths or where more than this amount is cut off, only one end can be sawed at a time. Before the rail is sawed the sawyers examine it and classify it as to quality, marking the rail accordingly. They also examine carefully the freshly sawed ends for flaws in the metal. After leaving the saws the burrs at the ends of the

rail resulting from the sawing are chipped off with chisels. The rail then passes to the drilling machines, four of which are provided, and two or three holes are drilled in each end for the fastenings at one operation of the machine. The rail passes directly from the drilling machines on to lines of rollers leading along stock piles. When the pile is reached corresponding to the number designated by the sawyer the rail is slid on to skids and then lifted on to the storage pile with an air hoist awaiting shipment out on the line again.

After passing through the mill the usable rail is divided into three classifications according to condition. The rail in the first class is suitable for important branch lines where smooth riding track is important. The second quality rail is used for less important branch lines and for heavy traffic freight tracks, while the third class is used for yard and side tracks. This year the first class has been further divided into two qualities, the second of which is used on important freight tracks.

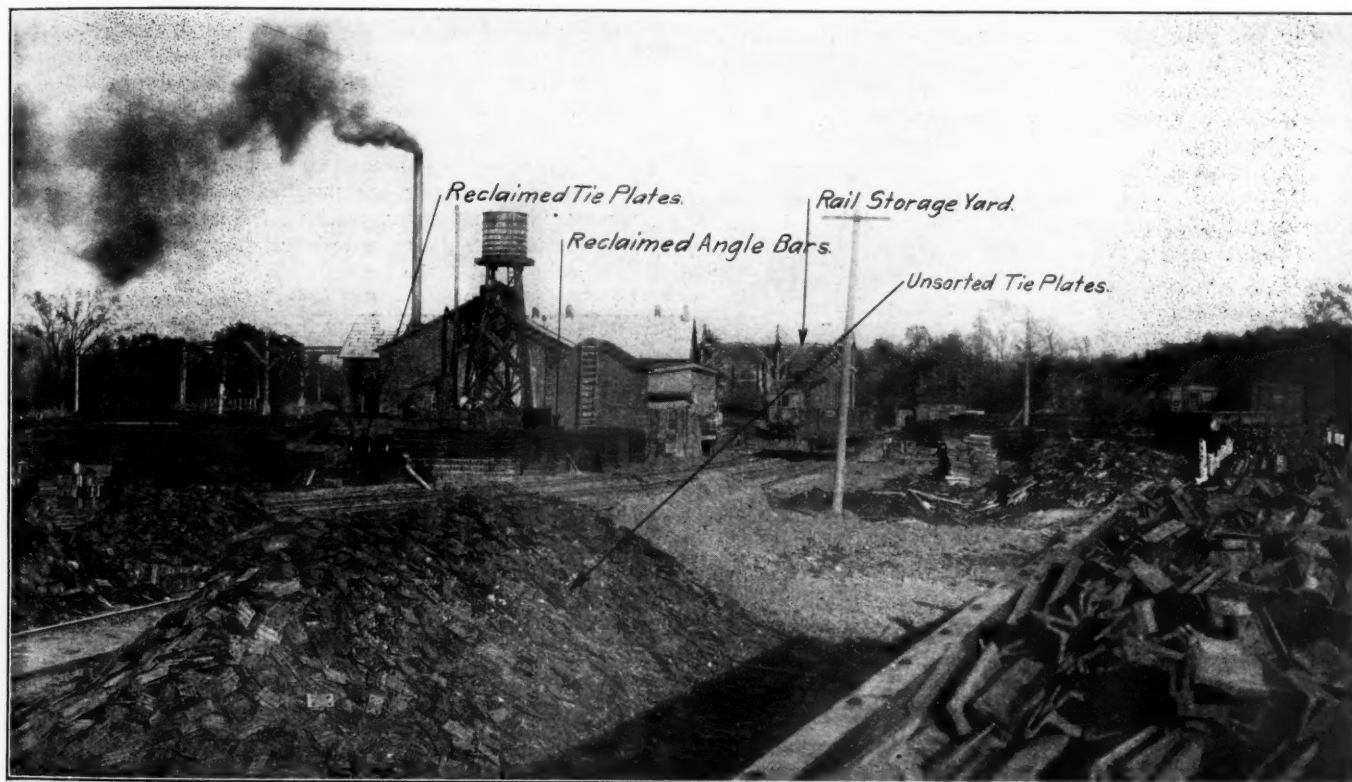
The C. M. & St. P. has for a number of years sent large

ened and drilled rails per day of 10 hours, while the maximum number ever put through the mill in one day was 800 60-lb. rails. Two men unload the rails from the cars on to skids leading into the mills, three men work on the straightener, three on the saws, two chip the burrs from the rail and four are on the drill presses. From two to four men are employed on the stock piles, varying with the amount of material which is being handled. The cost of handling the rail, including the unloading, straightening, sawing, chipping, drilling and placing on the stock piles, averages about 50 cents per ton.

RECLAIMING TRACK FASTENINGS.

A very important part of the work done at this yard is the reclaiming of tie plates, angle bars, joints, etc. This material is sent in with the rail, frequently being loaded on the same cars.

A large proportion of the tie plates which are released are reclaimed here for further service. As the plates are received most of them have considerable wood and gravel adhering to the



Reclaimed Track Fastenings; Chicago, Milwaukee & St. Paul Yard, Savanna, Ill.

quantities of rails of heavy sections to Joliet, Ill., where they are rerolled by the McKenna process. These rails are sorted on their arrival at Savanna and those fit for rerolling are shipped to Joliet while the others are disposed of as outlined above. Short sections of second-hand rails of good quality are cut to the proper length for frogs and switches and are sent to the company frog and switch shops at Tomah, Wis., for use in making frogs and switches.

All lifting of usable rail in unloading from cars, handling on the stock piles and loading from the piles on to cars, is done by means of vertical air cylinders, to the lower ends of which rail tongs are connected. These cylinders move on overhead tracks which are carried on the timber framework shown in the accompanying view. With this arrangement one man can pick up three rails at one time, one inverted between two upright, as shown in the piles in the foreground, and transport them to any portion of the pile desired. In this way the cost of loading rails from stock piles on to the cars has been reduced to five cents per ton, while two men can unload 200 tons of rails from the cars on to stock piles in one day where no sorting is necessary.

The average capacity of the mill is about 500 sawed, straight-

undersides between the flanges. To remove this the plates are piled and kerosene is poured over them and fired, burning out the larger portion of the wood. That which remains is removed by boys using hammers, chisels and small hooks made for that purpose. These boys also sort the plates into piles according to the kind of plate and also divide them between those suitable for main line, those suitable for side tracks, those requiring straightening, and scrap. The plates sorted out for main track are practically as good as new, while those for side tracks are inferior in that they are worn, corroded or slightly cracked. By using them in this way it is possible to tie-plate many side tracks at a very small expense with plates which would otherwise go in the scrap pile. The straightening is done with a 300-lb. air drop hammer falling about three ft. on to the plate. The plates are carefully stacked according to their kind and condition awaiting shipment, as shown in one of the accompanying views.

A large number of tie plates are repunched each year for sections of rail other than those for which they were originally intended. Last year about 200,000 plates, both malleable iron and steel, were handled in this manner at an approximate cost of \$238.18, or \$1.19 per thousand. With the increasing use of rail

joints in place of angle bars a large number of joint tie plates are accumulating which are too long for use as intermediate plates. These plates are sheared to the proper length and repunched, the shearing costing about 50 cents per thousand plates.

Last year 107,487 new tie plates were shipped from this yard at a cost for handling of \$75, and 495,000 second-hand steel and malleable iron tie plates were furnished from here at a cost of \$1,371.56. Including the cost of punching the 200,000 tie plates referred to, the total cost of handling these 495,000 second-hand tie plates and putting them back into service was \$1,609.74, or \$3.25 per thousand plates, which included the cost of unloading, sorting, removing wood, straightening, piling in storage, and reloading. In addition to this, 224 tons, or about 20 per cent. of the total output of tie plates, were disposed of as scrap.

Many of the angle bars and joints received with the rail have to be worked over before being returned to the track. Large numbers of the 6-hole 40-in. angle bars which were commonly used several years ago are now being released. Many of these are badly worn at the top on the center directly under the end of the rail, especially if they come from double track. Because of this wear they cannot be returned to main track in their present condition. A 12-in. piece is therefore cut from one end changing the center of the bearing 6 in. and offering a new support for the head of the rail. The angle bar is repunched for larger bolts and for new spacing and is reslotted for spikes when it is again suitable for main line track. In reclaiming the angle bars three men are able to handle 1,000 bars daily. The cost of reclaiming these angle bars in this way is 0.8 cents per bar. A considerable number of Weber joints have recently been removed from the track after 10 years' service and these are also being repunched for larger bolts and returned to main lines.

A small excess and emergency stock of new rails is maintained here, although most new rail is shipped directly from the rolling mills to the point of laying. Sufficient track bolts and nutlocks are kept here to supply all rail shipped from this mill, but all track spikes are furnished direct by the store department.

Very careful records of the entire cost of operation is kept of the mill and of the material handled. A report is made four times a month to the inspector of rail at Chicago, showing the amount of new and second-hand rail on hand of the different weights and qualities, together with the amount of rail on hand to be sawed and straightened, and the amount of scrap. Similar information is shown regarding tie plates and angle bars. From this report the inspector determines the distribution of rail on the various requisitions and instructs the mill regarding loading.

Including those previously mentioned in the rail mill, about 45 men are employed, the larger part of whom are foreign. The labor expense of operation of the entire plant last year was \$18,943, while the material expense, including fuel and storekeeper's charges, was \$3,245. The amount of usable steel rail received was 20,676 tons, while 20,338 tons were shipped; 4,420 tons of new steel rails were received and 3,789 tons shipped; 12,428 tons of scrap steel rails were received and 12,560 tons of scrap rails disposed of; 1,761 tons of iron rails were received and 2,087 tons sold; 1,141 tons of new fastenings, including tie plates, were received and 1,876 tons forwarded, while 3,393 tons of old fastenings were received and 2,183 tons were shipped out. While considerably under the figures of some previous years, this tonnage represents about an average year's work.

This mill is operated under the supervision of J. G. Woodworth, inspector of rail, and John Reinehr, superintendent of the rail mill, to whom we are indebted for assistance in securing this information.

In an address given before the last annual convention of the American Wood Preservers' Association, Harold F. Weiss called attention to some experiments being conducted at the Forest Products Laboratory at Madison, Wis., and exhibited a piece of red oak which had been "conditioned" in a treating cylinder, with the result that its strength was more than doubled. In other words, by a manipulation in the cylinder this piece

of oak was made twice as hard as it originally was. If it should be possible to develop this commercially there would be a great field for the treating of soft wood ties, such as loblolly pine, to secure a much harder and more durable tie.

THE TRACK FOREMEN OF THE FUTURE.*

BY WILLIAM J. POTTER,
University of Pennsylvania.

At the present rate of pay we cannot get a man of the required caliber to take the position of track foreman. We have two alternatives; either attract good foremen by compensating them for their ability and finding your return in the increased work of the less skilled laborers, or take the men you now have, and by the expenditure of much money train them to fill the positions with at least a fair degree of efficiency. The former of these two methods has proved to be applicable, with profits both by increased efficiency and by decreased costs. Is it not a mistake for railway managers to allow the question of immediate returns to blind them while the more important question, permanence of supply, is allowed to take care of itself? In the quest for immediate gain do they not in the long run suffer loss? The skilled men have been driven out of the business by the low wages paid. Our large and progressive roads are facing this problem, knowing that it must be solved, and the sooner the better. The Union Pacific has installed a series of lessons for trackmen, nine in number, reaching from the minor duties of caring for tools to the more technical training necessary to install a switch and grade curves.

I believe that by raising the wages of the foremen the standard of efficiency of the men, and the amount of work performed could be increased to make the investment a profitable one. Last summer I saw what a foreman can do if he has a proper incentive. This young foreman was the son of a farmer who lived adjacent to the roadbed. He had grown up on the section and loved the outdoor life too well to look for better opportunities elsewhere. Evidently he had been reading the new doctrines of efficiency and being of a practical turn of mind had begun to apply them to the work in hand. When lining track, he had all the men of one nationality working together, and he had previously picked out the fastest workers in each group. The roadbed had four tracks, so he divided his workers into groups of four, all within reach of his voice. After the track had been lined up properly and the men were about to start tamping, he would set the fast men on the right-hand track, and make the others keep pace with them. He established a certain amount of work to be completed each day, and when the men had completed their day's allotment they were allowed to go home. The men all accepted this idea and often worked hard during the noon hour in order to get the work finished on time. The men themselves prevented any individual soldiering. In direct contrast is the next section below, which is in charge of a foreigner, who is the despair of the road master. His tools are continually being stolen and broken by the men, his curves are so poorly watched that engineers from the main office are often out there checking; and he has no real control over the men under him.

The pay that is given section foremen, \$60 for the road sections and \$65 to \$75 for the yards and terminals, is not enough to tempt men of ability to apply their best efforts in the interest of the company. Pay the best men high wages and see that they repay it by increasing the output of work. The work on the track is sufficiently standardized to permit the assignment of tasks, making the men perform the task set, and paying them a certain proportion of the increased value of the work. Select foremen who are well qualified to set tasks for the men, give them high wages to see that the men perform the work as planned, and pay men proportionate increases for their extra effort. By investing in the high-priced men you can get a

*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

type qualified to handle the additional clerical work; by being square with the men, you avoid labor troubles and build up a loyal feeling among the workers toward the road.

THE SECTION FOREMAN PROBLEM.*

BY EX-TRACK INSPECTOR.

After considering the track foreman problem for 20 years I have evolved no better plan than the one used by a railway builder and manager, away back in 1884-90. Like all good, workable plans it was perfectly simple. On each section he had his regular foreman, and each foreman picked out the best man in the gang and put him down as "second hand" at ten cents a day more than the other men. This man was to be the foreman of the future. He knew it, and did all he could to be ready when his time came. The ten cents a day paid him in part, at least, for the extra work and study necessary while he was waiting. This plan appealed to all that was worth while in the men. The foreman looked forward to handling the extra gang. The second hand looked forward to taking his foreman's place, or getting a section for himself, while each man in the gang looked forward to being second hand, and some day foreman.

I watched the working of this plan for years, and know that it was good. I saw it discarded under new management, and watched good men drift away when the prize, or reward for extra effort, was withdrawn; and ambition died in those who remained. Of all the plans I have seen tried I have seen none that worked so well as this one.

THE FOREMAN PROBLEM.*

BY M. GAULEY,

Roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.

In districts where there are not many large towns or cities close by and the young white men are working on sections, the roadmaster has an opportunity to get some material for foremen, but there are not many of these districts left now, and in most places all labor on the sections is foreign.

I have tried to pick out foreigners who would make good foremen after a couple of years' training, and when I had brought them up to a point where the foreman and myself both thought we had a fair man, and have brought them into the office and told them what I intended to do, they would go back to work and in less than a week would be endeavoring to run the gang of the foreman they were working for. All the good I had accomplished in a year or two of training would be lost in 15 or 20 minutes conversation. I have tried to place them between reliable white foremen so I could depend on the white men for any critical or important work.

I have resorted from time to time to the various methods of getting foremen and educating them, but have found nothing that I can work out with the facilities afforded roadmasters, which will give more than temporary relief. Monthly meetings of section foremen have brought good results; and assistant foremen in extra gangs have helped relieve the distress, but I am a firm believer that the following method would work out well.

Subdivide the territory under a general roadmaster among three to five roadmasters, and install on each general roadmaster's territory a student gang of white men, receiving a prescribed daily wage the first year, an increase the second year, and a stated monthly salary the third year. The gang should contain not less than 30 nor more than 40 men. Pick out a competent track man for a foreman, having all reports from this gang rendered both to the general roadmaster's office and to the roadmaster on whose territory the gang was working. See that a strict personal record of every man in the gang is kept. The general roadmaster could move this gang from one division to another, to the different roadmasters for different work, so that

the gang will have to do every kind of work that will possibly come up in the track department.

The gang should be divided in three bunches, ten men on the first year, ten on the second year and ten on the third year. The men on the third year should be used as foremen to be sent out to relieve foremen that are lying off. This would also give the roadmaster a chance to call on his general roadmaster for a foreman to relieve other foremen who had been working for the company a long time to permit them to have a vacation once a year. This is something that is not afforded section foremen and which men on a monthly salary in most other departments get. No relative of the general roadmaster or the roadmaster in charge should be permitted to work in the gang. Permit the men to have a boarding car on a co-operative plan. There should be an instructor, similar to the one furnished machinist apprentices, and all of the third-year men should be educated on the technical points that come up in track work. They should receive four or six lessons a month and they should have a study car which should be supplied with literature that pertains to track work.

THE FOREMAN PROBLEM.*

BY J. L. TAYLOR,

Assistant Division Engineer, Grand Rapids & Indiana, Fort Wayne, Ind.

Neglect has caused the present scarcity of good section men. While the wages of other railway employes have increased considerably in the last twelve years, the wages of the section man have lagged far behind in proportion. The present foreman is often an old railroader, bent and gray after many years of faithful and hard service; between him and the average track laborer there is a wide gap which may well cause uneasiness when the supply for the future is considered.

There are still many localities where Americans are available for section foremen. In order to keep this class of labor against outside demands, the railways should make the job of foreman an attractive one. Better pay than at present, with perhaps additional duties such as maintaining signals, etc., steady work and prospects of retiring on a pension will always attract a good class of men. At the same time the laborers should be receiving better wages. To provide a supply of American foremen for the future, each subdivision should carry a fixed number of laborers who may be styled Assistant Foremen and who should receive a higher rate of pay than the ordinary laborer.

At many places Americans are not available and section gangs are composed of foreigners bossed by American foremen. The foreigners are usually "any old thing" that can be supplied by a labor agent, and consequently the job of bossing is most distasteful, and each year finds it harder to get competent men who are willing to take the job of foreman at present wages. If the railway companies would spend as much in proportion to obtain \$100,000 worth of labor as they do to buy \$300 worth of, say, ornamental iron railing, then the class of laborers employed would be better suited to the requirements. Foreign laborers should be carefully chosen and some attempt made to get men who would be willing to stay in the service, so that the present "floater" could be eliminated. By carefully composing gangs of foreigners willing to work and to learn the trade of section man, a class of men available for foreign foreman would surely develop. The railways of Europe are kept up by native laborers, so why could not the same laborers keep up the railways of this country? They can, and they will, but first they must be taught our methods. A "boss" supplied by a labor agent is usually a good politician, but a very poor foreman. American foremen of the required temperament can teach foreign laborers a good deal in a few weeks. Foreigners chosen for their skill, adaptability, willingness to learn and knowledge of reading and writing could be put under a competent and patient foreman whose duty it would be to teach the men the art of track work; and in time they would become competent to act as foremen, and would make good foremen, too.

*Received in the contest on The Section Foreman Problem, which closed March 25, 1912.

METHODS OF BRIDGE NUMBERING.

The practice of designating railway bridges by number is practically universal and its advantages are generally recognized. The correspondence and records referring to any structure are very much simplified and the making of reports concerning accidents and necessary repairs, and the issuing of slow orders to trainmen are greatly facilitated by such designation. Whatever the system adopted a complete record should be kept in the general office of the bridge department showing the number, type and location of all structures; convenient records should be supplied to the bridge and track department and to despatchers' offices; and the number should be displayed as prominently as possible on the bridge itself.

The methods used to display numbers at the bridge site vary on different roads and for different types of bridges. For through trusses it is quite common to stencil the number on the cover plate of the righthand end post, and for through girder bridges it can be similarly shown on the girder. For deck structures a number board or casting may be attached to the ties outside the guard rail, either resting on the tie or extending out beyond the end of the tie; a number post may be set at each end of the structure, or the number may be cast in the concrete of the abutments. The principal requirement of such signs is that they be permanent and conspicuous. Trainmen or officers riding trains often desire to refer to a bridge in their report and should be able to take the number as the train passes. In case of accidents it may save trouble in reporting the matter if the number is plainly visible to witnesses who may not be familiar with the bridge numbering system.

In general, all numbering systems can be divided into two classes; those which give bridges consecutive numbers without reference to location and those which base the numbers on some unit of measure of the distance from an arbitrary point so that the number represents a definite location on the profile. The letters submitted in response to a request by a committee of the American Railway Bridge and Building Association, and published in the 1911 Proceedings of that association, show that the following roads, representing a mileage of 36,299 out of a total of 111,425 reporting, use the consecutive system exclusively: the Boston & Albany; the Chicago, Milwaukee & St. Paul; the Grand Trunk; the Great Northern; the Intercolonial; the Missouri Pacific; the New York Central & Hudson River; the Norfolk & Western and the Pennsylvania Lines West. The following roads representing a mileage of 62,873 use the mileage system exclusively: the Atchison, Topeka & Santa Fe; the Canadian Pacific; the Central of Georgia; the Chesapeake & Ohio; the Chicago, Burlington & Quincy; the Chicago Great Western; the Chicago, Rock Island & Pacific, the Delaware, Lackawanna & Western; the Denver & Rio Grande; the Erie; the Illinois Central; the Lehigh Valley; the Michigan Central; the New York, New Haven & Hartford, and the Southern. Three roads, the Baltimore & Ohio, the Lake Shore & Michigan Southern and the Northern Pacific, with a combined mileage of 12,253, report that both systems are in use.

The details of either system as worked out on the various roads may differ considerably. With the consecutive system it is customary to separate the structures into several series which may or may not be distinguished by letter prefixes or suffixes. The Baltimore & Ohio numbers the bridges on each division independently, the lower numbers being used for the main line of the division and a series in a separate hundred for each branch. On the Chicago, Milwaukee & St. Paul all bridges on a division are included in one series which is distinguished from other divisions by a letter prefix. All bridges on this road have even numbers, the odd numbers being reserved for culverts. The Great Northern has a separate series for each branch, no distinguishing marks being used, so that there are several bridges on the line whose numbers are duplicates, and in referring to a bridge by the number the location is always indicated. The bridges on the Intercolonial are num-

bered consecutively, westward from each station. Milepost records are also kept in the bridge inspection books to locate the structures. The keeping of such milepost records is very common, and many roads have small blue print plans prepared for the use of track and bridge men and despatchers' offices. With the consecutive system it is necessary to use fractional numbers or letter suffixes to designate bridges added after the numbers are assigned to obviate the necessity of renumbering the remainder of the series. Three roads, the Baltimore & Ohio, the Chicago, Milwaukee & St. Paul and the Lake Shore & Michigan Southern, report that they use fractions for this purpose, and two roads, the Grand Trunk and the Norfolk & Western, mention the use of letters.

The systems of numbering based on the location of the structures usually refer to the mileage from some terminal, the distance beyond the nearest milepost being commonly expressed in tenths or hundredths of a mile. For example, bridge number 42.61 would be .61 miles beyond the milepost 42. Three of the reporting roads, however, use letter suffixes to designate the bridges between consecutive mileposts, as 42A, 42B and 42C for three consecutive bridges, between mileposts 42 and 43. These roads are the Atchison, Topeka & Santa Fe, the Denver & Rio Grande and the Lehigh Valley. The Northern Pacific has used a decimal to indicate the number of bridges beyond the last milepost, in which case the three bridges referred to would become 42.1, 42.2 and 42.3. Mr. Stevens of the Northern Pacific, and Mr. Bland of the Pennsylvania Lines West, both express their preference for the use of multiples of 100 ft. to indicate the fractions of a mile. Under this system a bridge located 2,840 ft. beyond milepost 42 would be numbered 42.28. In the mileage system, as in the consecutive, letters may or may not be used in connection with the number to indicate the division or branch on which a bridge is located. The Missouri Pacific has used a system based on telegraph poles instead of mileposts on some divisions where mileposts are not set along the line. The nearest telegraph pole to each mile is painted white for about 10 ft. of its length and the mile number painted on it. The bridge cannot well be numbered by any other mileage system, as confusion would arise. This has some obvious disadvantages, however, as the spacing of telegraph poles may be frequently changed and is usually not the same over the road.

A consideration that complicates any system of bridge numbering is the necessity for providing a record for the culverts and other small openings. Some roads do not assign numbers to anything but important bridges. The Rock Island does not number any culverts; the Chesapeake & Ohio does not number any opening under 10 ft.; and the New York Central & Hudson River does not assign numbers for openings less than 4 ft. On the Northern Pacific culverts take the number of the nearest bridge in the direction from which the series is numbered with the addition of the letter suffix. A similar system is used on the Lehigh Valley, except that a cipher precedes the number as an indication that the structure is a culvert. As mentioned above, the Chicago, Milwaukee & St. Paul reserves all odd numbers for culverts. The Spokane, Portland & Seattle is considering the plan of numbering bridges to tenths and culverts to hundredths of a mile to distinguish the type of structure. It is argued in favor of this system that bridges are usually long enough to avoid any confusion which might arise from using only tenths for their location. The roads that do not differentiate between bridges and culverts argue that the frequent change of bridges to culverts makes it desirable to show only location by the bridge number.

In comparing the advantages and disadvantages of the consecutive mileage systems, several arguments are advanced by the respective advocates of the two methods. The consecutive system has been more generally applied on the old lines, and the fact that many roads have kept all their records on that basis for many years is in itself an argument against changing the system. It is considered by many men a serious matter to

change all bridge numbers on a road, as a great deal of confusion and misunderstanding may result. The consecutive system gives an indication of the total number of bridges on each section which is not furnished by the mileage system. On the other hand, it gives no indication of the location of the structure and the numbering is complicated when new bridges are built or old ones filled. The disadvantage of using either fractions or letters for additional bridges is a serious one when there are numerous additions, as for example, when tracks are elevated through a city and a number of new street subways are built. The use of the consecutive system in which all series begin with one means certain duplication of numbers, which often results in misunderstanding, especially when the number is used in telegrams and the designation of the division or branch may be altered or omitted.

The numbering of structures by location makes the assignment of numbers automatic and indicates to every one familiar with the road at least the approximate location of the bridges. Such a system greatly simplifies reference to structures as it is possible to locate any given bridge by number from a time card. New bridges can be inserted or old ones filled without affecting the numbers of the other structures. A number of the bridge engineers who report the use of the consecutive system on their roads express their personal preference for the mileage system. On the other hand, there are several disadvantages which are urged against this method of numbering. The numbers frequently involve five figures, making them difficult to remember. In case a number board is lost from the bridge and the number is forgotten, it cannot be supplied by reference to the nearest bridge, as can be done in the consecutive system. In case of line revisions which change the distance of the structures from the terminal, all numbers must be changed to agree with the new mileage.

The following comments have been abstracted from the letters submitted to the Bridge and Building Association, as mentioned above, and from which considerable data for the preceding article has been taken:

J. C. Bland (Engineer Bridges, Pennsylvania Lines West): I think the numbering of bridges is an arbitrary matter which we become accustomed to, and when once learned it is pretty hard to replace. The merits of the decimal system of numbering are many, but in reality I think are largely theoretical. If the matter were left entirely in my hands I would adhere to the consecutive numbering system.

G. W. Rear (Bridge Inspector, Southern Pacific): I recommend that structures be numbered with the mile number and a letter to designate the order in which openings come beyond the mile board. The numbers should include all openings through the embankment which terminate on the company's property, also overhead structures which are maintained by the railway. This method eliminates sewers, water pipes, etc., which are continuous, and overhead structures for which the company is not responsible. I would not number surface or slat cattle guards, but would number pit guards, pipe culverts, etc.

W. F. Steffens (Engineer Structures, Boston & Albany): My personal preference has always been for a consecutive system coupled with milepost records in the office.

C. H. Cartlidge (Bridge Engineer, Chicago, Burlington & Quincy): It is my firm conviction that the double decimal system of numbering is the best.

A. W. Carpenter (Engineer of Structures, New York Central & Hudson River): We tried at one time to adopt the mileage system of numbering bridges, but found it unsatisfactory for the following reasons: First, it made great confusion in our records, the bridges having been numbered consecutively and no changes having been made for many years. Second, the mileage system was found to be changeable, varying with any change in the length of line caused by change in alinement.

I believe personally in the consecutive system of numbering

as the most satisfactory. All pipes, box culverts, small arches and other openings under 4 ft. are scheduled, showing their relative position and milepost location, but they are not given a number.

H. E. Stevens (Bridge Engineer, Northern Pacific): In my opinion bridges should be numbered with reference to the easterly milepost plus the number of hundreds of feet they lie west of said milepost. The numbers should be written in a circle with the milepost number on the upper half, and the number of hundreds of feet on the lower half, with a horizontal line between.

L. D. Hadwen (Engineer Masonry Construction, Chicago, Milwaukee & St. Paul): Personally, I consider a system of number which designates the location of a bridge with reference to its actual position on the profile as most desirable, especially if used with a letter prefix for each division. It is increasingly difficult to separate openings under track into bridges and culverts, for many structures might be considered as belonging to either class. Moreover, bridges are continually being replaced with culverts. This fact makes it desirable to have the openings numbered without reference to their character and entirely by their location.

Howard G. Kelly (Vice-President, formerly Chief Engineer, Grand Trunk): I believe the best method of numbering bridges is by mileage and tenths, without necessarily complicating the reading on the number board by the insertion of any letter or other designation for the division or district in which it occurs. Ordinarily, on a large system no man can carry in his mind all of the letters which designate the divisions, nor can he remember the various bridges by number except the most important ones.

PIECEWORK WAGES IN A TIMBER TREATING PLANT.

In a discussion on the operation of tie plants at the last annual convention of the American Wood Preservers' Association, Secretary F. J. Angier, superintendent of timber preservation of the Baltimore & Ohio, gave the following information concerning the establishing of piecework rates at a timber-treating plant on the Burlington in South Dakota. At the time this system was installed they were handling ties on a day basis, paying 17½ cents per hour. A gang of ten Swedes was secured and they were placed under a good foreman, who was instructed to see that the men worked steadily and gave a good day's work. The record of the number of ties handled was carefully kept for a week and this number divided into their total wages gave the cost per ties on a day basis. This gang of Swedes was then placed on a piecework basis with a rate a trifle less than had been paid on the day basis. The result was that they very quickly increased their monthly wages until they made from \$75 to \$90 a month where they had previously made about \$45. The company did not decrease the rate, as with the increased output the cost of the work to the company was lessened, because of the reduction in the cost of the foreman's supervision and overhead charges.

The new Hungarian passenger tariff, taking the place of the famous zone tariff, goes into effect July 1 of this year. Generally speaking, it is a mileage tariff in which the miles are 6.2 miles long. On express trains the rates are the same for all places within 18.6 miles, namely 30, 48 and 72 cents respectively for the three classes. But by passenger and mixed trains within this distance, which may be called the suburban zone, the rates vary according to distance, as: Third class, 4 cents for 3 miles, 4.8 for 6 miles, 7.2 for 9 miles, 10 cents for 12.4 miles, 14 cents for 17 miles, and 20 cents for 18.6 miles, one-half to two-thirds for second class, and 2½ to three times as much for first class.

General News Section.

Mr. Kruttschnitt announces that safety committees are to be organized throughout the Harriman lines on the first of July.

Suits were filed in the United States district court at Salt Lake City on June 13 against the Denver & Rio Grande for 20 alleged violations of the hours of service law.

At Malmstaett, Sweden, June 15, according to a press despatch, there was a collision between a passenger train and a freight in which 18 persons were killed and 16 injured.

The Pennsylvania Railroad System in the past 25 years has paid in wages \$2,220,034,753, or double the amount of the national debt. The system has 11,503 miles of line, 25,236 miles of track, and about 185,000 employees.

It is announced that the National Packing Company, a \$15,000,000 corporation, said to be owned jointly by the Armour, Swift and Morris interests, and which has been unsuccessfully prosecuted as the "beef trust," has informed the attorney-general that a plan of dissolution will be submitted to the government by August 1.

The Pacific Railway of Nicaragua (Ferrocarril del Pacifico de Nicaragua) has been incorporated in Maine, to construct and manage public utilities and other enterprises. The authorized capital stock is \$3,300,000. The temporary officers are: President, Clarence E. Eaton; treasurer, T. L. Croteau; clerk, James E. Manter.

Officers of the Oregon Short Line have recently completed a second annual "get acquainted" tour, during which all the lines of the company south and east of Pocatello, Idaho, were covered—more than 1,000 miles of road. Stops were made at 60 stations on the main line and branches and meetings and conferences were held with the citizens of the towns.

"Strength Tests of Cross-arms" is the subject of a report by Thomas R. C. Wilson, assistant engineer in forest products for the United States Department of Agriculture, printed in circular No. 204 recently issued by the Forest Service bureau. Mr. Wilson, in a pamphlet of 15 pages, gives the results of tests made by him at the University of Wisconsin, on 84 cross-arms.

Suits were filed in the United States district court at Chicago last week against the Baltimore & Ohio and Chicago, Milwaukee & St. Paul, to recover \$8,000 in penalties for violations of the federal hours-of-service law. The Chicago & North Western was fined \$100 in the district court of Chicago on June 14 for a violation of the 28-hour law in the transportation of live stock.

A committee of the Chicago city council which has been trying to settle the Chicago freight handlers' strike held a meeting with representatives of the strikers on June 17 and later called on W. A. Garrett, chairman of the Chicago General Managers' Association, who informed them that no formal settlement of the strike was possible, as some of the roads had filled all positions left vacant and that the men would have to apply individually to be taken back.

About 250 members of the Traffic Club of Chicago took advantage of the opportunity afforded them on June 11 by the Chicago & Western Indiana and Belt Railways to inspect the network of the Chicago terminals in a special train. The party spent nearly the whole day in making the trip over the lines of the company, which connect with practically every road entering the city, crossing some 38 roads, and viewing some of the principal industries of the city.

On the Lehigh Valley one day this week a freight train which was run from Buffalo, N. Y., to Sayre, 177 miles, was loaded wholly with iron ore, and the weight of the cars and lading was 6,663 tons. The number of cars was 95, and there were two engines. At Sayre five other cars were added, making a train of 100 cars from Sayre to Coxtown. Last week a train of 100 cars, weighing 6,200 tons, was run through solid from Buffalo to Coxtown, 260 miles.

The Pennsylvania Lines west of Pittsburgh carried, during the calendar year ending on the 31st of last December,

32,558,337 passengers, who traveled 1,138,329,577 miles; and not one was killed in any train accident. The Vandalia Railroad, which is a part of this system, has maintained a record like this for five years, and during that time has recorded only 46 passengers injured in train accidents, this number including every case requiring medical or surgical attention, however trivial. The Grand Rapids & Indiana reports a similar freedom from fatal accidents to passengers for five years.

Reports printed in the daily papers last week to the effect that the Canadian Pacific has ordered many thousands of new cars were denied by officers of the road as entirely without foundation. This week despatches from Ottawa, reporting a hearing before the Canadian railway commission, quote an officer of the road, J. W. Leonard, as saying that the directors of the company have authorized an expenditure of \$19,000,000 for cars, but that it has been impossible to find car builders to take the contracts. All the shops are behind in their orders. This statement appears to have been made in connection with a general inquiry which is being made by the Canadian commission based on alleged complaints that there is a shortage of freight cars throughout Canada.

The Grand Trunk Pacific has opened its line from Prince Rupert on the Pacific coast eastward to the Skeena river crossing, and trains will be run three times a week each way. A gap of only about 400 miles now remains between the Pacific end and the Winnipeg end of the Grand Trunk Pacific. Contractors' trains are now running and carrying passengers and freight on the National Transcontinental for 130 miles west of Cochrane three times a week, and also for 150 miles east of Cochrane twice a week. Cochrane is a short distance west of the Quebec-Ontario boundary, almost directly north from Sault Ste. Marie, and 524 miles east of Superior Junction, which is now known as Graham. It is estimated that there are now 5,000 settlers along the line of this road between Graham and the Manitoba boundary.

The Common Pleas court at Philadelphia refused last week to make permanent the temporary injunction which had been granted forbidding three employees' brotherhoods to act together in their attempt to secure increased wages or improvements in service from the Pennsylvania Railroad Company. The separate committees, however, had taken action independently and the leaders now say that they expect to be able to announce next Monday that their constituents have given them the desired authority to use their judgment as to calling strikes. Press despatches say that walking delegates are active all over the lines east of Pittsburgh. The ballot on which the men are asked to vote fills four pages, and it is said that many employees vote to support their leaders without reading the ballot. One well-informed employee estimates that half of the men voting on this proposition are over 45 years old.

Electrification of the B. A. & P.

The electrification of the Butte, Anaconda & Pacific is of exceptional interest, because it represents one of the largest installations of electrical equipment for steam railway service and the first in this country where 2,400 volt direct current locomotives will be employed. The work necessary to change from steam to electricity is now going on, and it is hoped that the electric operation will be begun early next year.

The section of the road to be equipped is that between Butte and Anaconda, Mont., comprising about 30 miles of main line, single track, and a total track mileage including the sidings and smelter tracks, of 114 miles. The remaining 24 miles of the road, embracing the mine tracks on Butte Hill, minor sidings, etc., will continue to be operated by steam; although it is probable that the entire system will be electrified at an early date.

The 2,400 volt direct current system was adopted by this road after a careful study of local conditions. In comparison with other existing systems, it was found best suited for the heavy trains run over its tracks. The main line trains of the Chicago, Milwaukee & Puget Sound run over the Butte, Anaconda & Pacific for a distance of 16 miles, and this calls for trunk

line freight and passenger service in addition to the heavy local freight traffic. The freight consists principally of copper ore from the Butte mines to the smelters at Anaconda, and with mine supplies, lumber, etc., moving in both directions, amounts to approximately 5,000,000 tons of freight yearly. Complete trains, weighing 3,400 tons and made up of 50 loaded steel ore cars, will be hauled by two locomotives up a ruling grade of 0.3 per cent. Single locomotives will be used for making up trains in the yards.

The entire electrical equipment for this installation is being furnished by the General Electric Company. Seventeen 2,400 volt direct-current locomotives of the articulated truck type, each weighing 75 tons, have been ordered. Each locomotive will be equipped with four GE-229, 1,200 volt, commutating pole, twin geared railway motors insulated for operation, two in series on 2,400 volts. The motors will be ventilated by a forced circulation of air, in addition to the ventilation secured by the fan in the armature. Sprague General Electric Type M control equipments, will be used, a dynamotor being used to furnish 600 volts for the operation of the contactors, lights and air compressor. The cabs will be heated by special heaters, using 2,400 volt direct current direct from the trolley circuit.

Two of the locomotives are designed for passenger service. There are four passenger trains a day, each way, the average train having three passenger cars. When hauling a train of three coaches, the passenger motors will be capable of running 45 miles an hour on level track. Current for lighting the cars will be taken from the 600 volt circuit of the dynamotor, and for heating the coaches will be tapped from the 2,400 volt trolley circuit on the locomotive.

Two 2,400 volt substations are being installed, one at Butte, and the other at Anaconda, 26 miles apart. The equipments will each consist of two 1,000 k. w. synchronous motor-generator sets. Power for operating the motor-generator sets will be supplied from the 2,300 volt, 60 cycle, three-phase buses in the substation of the Great Falls Power Company, to which power is transmitted at 50,000 volts from the hydraulic power stations of the company.

A TA regulator will be installed in each substation to maintain constant voltage automatically at the terminals of the synchronous motors. Through this method of operation the possibility of the sets dropping out of step on extreme overloads will be eliminated.

Current for operating the locomotives will be taken from overhead conductors. A special flexible catenary trolley suspension will be used over the larger part of the line, with direct suspension over some of the difficult sidings. Side brackets and cross span construction will be employed where local conditions demand. Numerous yards are to be electrified, and at one point it will be necessary to span 12 tracks, which will be accomplished by cross span construction, using a third pole between the eight and ninth tracks.

Railway Financial Science.

The Boston Elevated Street Railway Company is maintaining practically normal service on most of the lines, but on others cars are infrequent. The strike will be a week old tomorrow morning and there are no indications of a settlement. The company has begun to weed out the dishonest conductors, many having been discharged yesterday and today (June 14). The thieving by some of the new men has been so open that it has become a public scandal. The money order department at the post office has been doing a big business with conductors, who have been sending from \$50 to \$100 each to New York and Philadelphia, making payment in dimes and nickels which were manifestly the proceeds of their "knocking down."—*Press Despatch*

Legislation in Massachusetts.

The legislature of Massachusetts adjourned without day on June 13. The law to authorize the consolidation of the three principal street railway companies in the western part of the state was vetoed by the governor, so that the only thing accomplished in that matter was the appointment of a committee to consider the question between now and the meeting of the next legislature in January, 1913. This committee consists of Mr. Coolidge and two other senators, and Mr. Hardy and three other members of the lower house. All of the proposed measures for changing the status of the New Haven road and the Boston &

Maine, and for the construction of a tunnel across the city of Boston failed, together with the proposals of the governor (which were modified several times) to change the status of the State Railway Commission or to establish some other body in place of it.

The Central of Georgia's "Higher" Educational Class.

Under the auspices of the Educational Bureau recently established by the Central of Georgia Railway, a class has been formed for the purpose of discussing modern railway problems and other topics of timely interest, to meet once a week. This class is composed of the heads of the several departments at Savannah, including chief clerks and those having similar duties.

The executive force of the organization consists of the assistant chief of the Educational Bureau, D. C. Boy, who performs the duties of chairman, and two committees; a program committee and a membership committee. This organization may well be termed an advanced educational class, as we have suggested in our title. The personnel of the committees is as follows:

Program Committee—

W. B. McKinstry, Freight Claim Agent (Chairman);
C. F. Groves, Car Accountant;
J. M. Fagan, Freight Agent;
A. R. Lawton, Jr., Chief Clerk, Law Department;
W. Mc N. Knapp, Chief Clerk to Freight Traffic Manager;
H. L. Feil, Chief Clerk, Passenger Department;
J. R. Koerper, Chief Clerk, Mechanical Department.

Membership Committee—

M. B. Nichols, Auditor of Traffic (Chairman);
G. F. Smith, Land and Tax Agent;
J. L. Bennett, General Storekeeper;
W. J. Robider, Master Car Builder;
H. V. Jenkins, Cashier;
J. B. Maddock, Bridge and Building Engineer;
W. B. Clements, City Ticket and Passenger Agent.

It is the duty of the program committee to formulate a list of subjects for discussion and also to make suggestions as to the most suitable person to discuss each topic. The speaker and his subject are selected two or three weeks in advance of the meeting at which the topic is to be discussed so that necessary preparation can be made. Meetings are held on Tuesday evening of each week.

So far the class has had four regular meetings, and lectures have been given by F. F. Gaines, superintendent of motive power, on fuel oil-burning engines; J. T. Johnson, general superintendent on telephone train despatching; W. D. Beymer, comptroller, on the manibill, and F. J. Robinson, A. G. P. A. on handling large crowds.

Such topics as the Long and Short Haul Clause; Yard and Terminal Work; Time Freight; Local Freight Trains; Industrial Development; Agricultural Development; Freight and Personal Injury Claims; Prevention of Loss and Damage to Freight, etc., will be taken up at future meetings.

There are other excellent features augmenting the value and importance of this class work; not the least of these being the "get-to-gether" spirit. This will undoubtedly result in increased co-operation among the heads of the several departments.

Practically every officer in the general offices is a regular member and is taking an active part toward making the class a success.

Argument Against a 45-Cent Per Diem Rate.

W. A. Worthington, assistant director of maintenance and operation of the Union Pacific and the Southern Pacific, has issued a circular urging all railways to vote against the proposition, which was sent to letter ballot by the American Railway Association at its meeting in May, to increase the charge for interchanged freight cars from 30 and 35 cents a day to 45 cents. He declares that the proposed large increase is uncalled for and is not in any way essential to increased car efficiency. The present plan of making the rate during the seven busiest months of the year five cents a day higher than in the months of lighter business, which was adopted in January, 1910, has not proved unsatisfactory or unwise, and there is no reason for abandoning

that principle. The per diem rate should represent as nearly as possible the cost of owning the car. A higher rate is unjust to borrowers, while yet it would not increase car efficiency; that is to say, it would not increase the movement of loaded cars. On the other hand, it would increase empty haul because it would increase the motive to send cars home. The high rate (50 cents) which was in force in 1907 and 1908 caused an undue stimulation of empty car movement; a 45 cent rate would have a similar effect when cars are plentiful. The committee, in recommending the 45 cent rate expressed the belief that it would stimulate the acquisition of cars; but at present many roads are unable to afford additional cars, and it is questionable whether it is necessary or desirable to increase the car equipment by allowing an unreasonably high return. Since January, 1908, there has always been a net car surplus; if a high rate had been in force and the number of cars had thereby been increased, we should simply have had an increased investment in freight cars and a decreased performance per car per day. The average mileage per car per day has been quite as good under the present rates as it was under the 50 cent rate. Supporting the statement that there is a surplus of cars, and explaining the fact, Mr. Worthington shows that since 1902 the total ton mileage of freight has increased but 64 per cent. while the aggregate carrying capacity of freight cars has increased 91 per cent., as shown by the reports of the Interstate Commerce Commission.

The special commission on the interchange of freight cars, reporting for 1907, found that the average cost of owning a freight car was 35.58 cents a day. Since then there has been a decrease, and for 1910 Mr. Worthington finds this cost to be 34.79 cents a day. This sum is made up as follows: Repairs, 17.99 cents; replacements, 5.06 cents; taxes, 1.06 cents; interest at 5 per cent. per annum on \$780, 10.68 cents; total, 34.79 cents. For a car away from home, Mr. Worthington would make this cost 2½ cents less, that being the estimated cost of repairs paid for by the road using the car. Excluding also the interest, the cost per day is 21.61 cents. Calculating the average per diem rate at present as 32.9 cents throughout the year, this leaves the owner a profit of 11.3 cents a day, or \$41.25 a year for interest on his investment. This amounts to 5.3 per cent.; whereas if the per diem rate were 45 cents, he would receive nearly 11 per cent. interest on the cost of the average car.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—W. C. Cooder, Carew building, Cincinnati, Ohio; 3d Friday of March and September.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.
- AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; annual, November 20, 1912, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, October 21-25, Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Convention, June 25-26, Bluff Point, N. Y.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
- CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
- ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
- FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
- INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.
- MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Convention, May, 1913, Chicago.
- MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.
- NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
- NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
- NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
- NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.
- RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York; annual, November 20, 1912, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
- RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.
- RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Convention, Oct. 8-11, Quebec.
- RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
- RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.
- RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.
- ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Niquist, La Salle St. Station, Chicago.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
- TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
- TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
- TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago.
- TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.
- WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The railways in Oregon, Washington and Idaho, with the exception of the Oregon Short Line, have entered into an agreement for the issuance of interchangeable 2,000-mile mileage books.

The street railway company in Cleveland which carries passengers for 3 cents each, reports for the month of May a surplus of \$32,000, which is said to be an unexpectedly favorable showing.

At a meeting of the Illinois Grain Dealers' Association at Peoria on June 12, a resolution was passed advocating that all public grain elevators in Chicago be owned and operated by the railways.

It is reported that up to June 13 the Great Northern ore docks at Allouez have handled 3,156,383 tons of ore this season as compared with 2,126,487 to the same date last year. Total receipts in 1911 were 9,773,061, and it is estimated that the total for this year will be about 13,000,000 tons.

C. W. Young & Company, of Philadelphia, have loaded an automobile truck with three tons of freight which they say they are going to send to Petaluma, Cal. The truck is to be exhibited along the road and it is planned to have it follow a route 4,436 miles long. The time schedule as laid out takes 45 days.

The Northern transcontinental railways have filed with the Interstate Commerce Commission westbound tariffs naming commodity rates from eastern shipping points to Oregon, Idaho, Washington, Montana and Wyoming, in accordance with the compromise agreement recently reached by the shippers of Spokane and the railways, which the commission allowed to become effective without giving its approval.

The American Hawaiian Steamship Company announces that five large new freight steamers are to be built, with a view to establishing a line from New York to San Francisco and Puget Sound through the Panama Canal. It is the intention of the company also to build two fast passenger steamers for this route. W. R. Grace & Company, of New York, will also have five new steamers built by the time the canal is opened.

W. L. Sargent, industrial and immigration agent for the Gould lines, has rendered a report that during the year ended June 1 over \$20,000,000 has been paid by immigrants for land along the line of the Texas & Pacific between Texarkana and El Paso, and that 22,745 people had moved into that territory. There were 758,790 acres of land sold at an average price per acre of \$26.30. One thousand eighty-five new immigrant cars and 3,446 cars of live stock and machinery were shipped into the territory during the year.

Car Surpluses and Shortages.

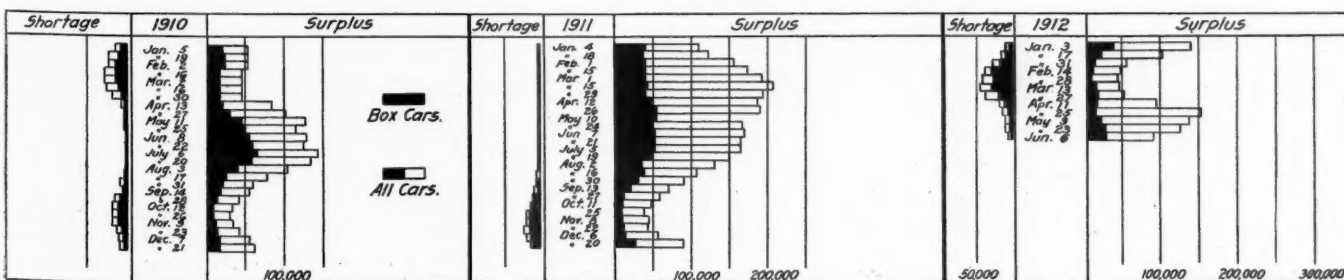
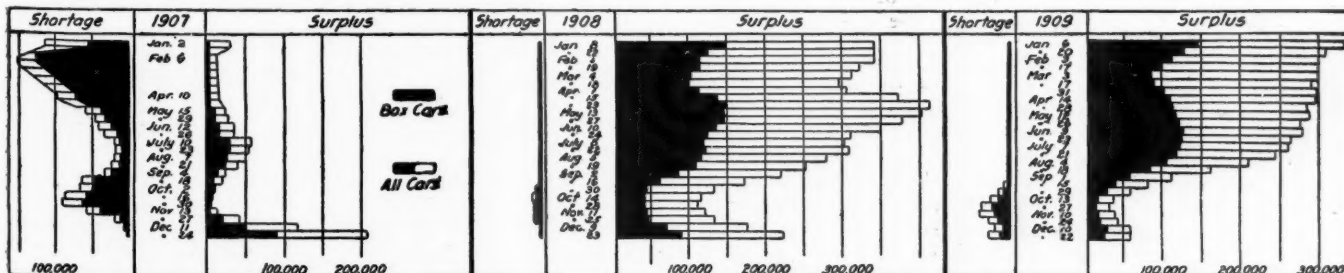
Arthur Hale, chairman of the committee on relations between railways, of the American Railway Association, in presenting statistical bulletin No. 121, giving a summary of car surpluses and shortages by groups from February 1, 1911, to June 6, 1912, says:

"The total of surpluses of cars on June 6, 1912, was 89,208; on May 23, 1912, it was 123,683 cars, and on June 7, 1911, it was 169,006 cars. Compared with the preceding period there is a decrease in the total surplus of 34,475 cars. The decrease in surplus coal cars is general throughout the country, except in Groups 4 (The Virginias and Carolinas), 9 (Texas, Louisiana and New Mexico), and 11 (Canadian Lines), where a slight increase is shown. The net decrease in this class of equipment is 35,283 cars. The box car surplus remains practically the same as shown for the previous period, there being a net increase of

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses					Shortages				
		Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal gondola and hopper.	Other kinds.	Total.
Group *1.—June 6, 1912.....	7	65	135	1,431	116	1,747	123	65	200	0	388
" 2.—" 6, 1912.....	25	2,537	116	15,057	1,110	18,820	1	2	0	3	6
" 3.—" 6, 1912.....	25	4,819	197	8,344	3,078	16,438	10	85	84	57	236
" 4.—" 6, 1912.....	9	1,701	29	888	1,398	4,016	296	402	0	0	698
" 5.—" 6, 1912.....	18	1,978	1	890	1,394	4,164	25	131	275	0	431
" 6.—" 6, 1912.....	24	2,804	467	2,086	5,057	10,414	103	27	63	35	228
" 7.—" 6, 1912.....	4	65	73	135	392	665	50	0	10	0	60
" 8.—" 6, 1912.....	18	3,412	347	4,535	2,706	11,000	0	100	0	0	100
" 9.—" 6, 1912.....	11	1,330	85	438	1,728	3,581	100	0	0	0	100
" 10.—" 6, 1912.....	23	4,846	2,023	1,970	8,565	17,404	84	2	10	57	153
" 11.—" 6, 1912.....	6	448	34	11	466	959	150	253	3	16	422
Total	170	23,906	3,507	35,785	26,010	89,208	942	1,067	645	168	2,822

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1912.

only 608 cars. A slight increase is also shown in surplus miscellaneous cars.

"The total shortage on June 6, 1912, was 2,822 cars, on May 23, 1912, it was 7,482 cars, and on June 7, 1911, it was 2,204 cars. Compared with the preceding period there is a decrease in the total shortage of 4,660 cars, of which 1,976 is in box, 551 in flat, 2,004 in coal and 129 in miscellaneous cars. The decrease in box car shortage is chiefly in Groups 4 and 11, and the decrease in coal car shortage is principally in Groups 2 (New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania) and 4.

"Compared with the same date of 1911 there is a decrease in the total surplus of 79,798 cars, of which 28,745 is in box, 3,285 in flat, 37,677 in coal and 10,091 in miscellaneous cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1912.

INTERSTATE COMMERCE COMMISSION.

The commission holds that a railway company and a telegraph company may exchange services with respect to strictly company matters on the basis of their private agreement.

The commission has postponed from July 1, 1912, to October 1, 1912, the effective date of the shipping-container specification No. 6, of its regulations for the transportation of explosives.

The commission in conference holds that in awarding reparation it will make no award except to a consignor or consignee as shown by the transportation records; that it will recognize an assignment from a consignor to a consignee, or from a consignee to a consignor, but will recognize no assignment to a third party.

The commission announces that it will make a general and exhaustive inquiry into the rates for the transportation of anthracite coal from the coal regions to all points east of the Mississippi and north of the Ohio and Potomac rivers, attention being given also to the question whether the railways own the mines or are interested in the production of the coal.

The commission, on June 19, ordered the Chicago & Northwestern, the Chicago, St. Paul, Minneapolis & Omaha and the Great Northern to establish by August 1 certain reduced freight rates between Sioux City, Iowa, and certain points in Minnesota. These rates were suggested by the commission some time ago, but the suggestion was ignored by the roads. The rates are said to be about 10 per cent. lower than those now in effect.

Rulings 98 and 337 do not apply where the consignment is to, or in care of, the carrier itself for the purpose of being forwarded by that carrier over its own line and connections according to routing instructions from the point of receipt at the regular rate, and where no lawful through rate is defeated and no discrimination or other violation of the act results. In no case must the same person act as the agent of the carrier and the shipper.

A consignor delivered a shipment to a carrier under a bill of lading on which the name and street address of the consignee at destination was entered. The carrier failed to transmit to its connection such street address. Upon arrival of shipment the delivering carrier sent notice of arrival to the general post office in a large city, which never reached the one addressed. The goods were warehoused and drayage and storage charges accrued thereon. It is held that where a definite address of the consignee is entered on a bill of lading, it is the duty of the initial carrier to transmit that address to its connections, and of each succeeding carrier to transmit it to its connection, and of the delivering carrier to send notice of arrival to that address, failing in which the carrier at fault will be held liable for demurrage or storage charges accruing as a result of failure of notice to reach consignee.

Boston Denied Differential.

In re: Import cases. Opinion by Commissioner Clark:

Following the Chamber of Commerce case (abstracted herewith) Philadelphia and Baltimore are allowed a differential over New York on import traffic; but Boston must maintain the same import rates as New York.

No Relief Under Long and Short Haul Clause.

In re Application of Southern Pacific for Relief Under the Fourth Section. Opinion by Commissioner Lane:

A previous report in this matter, 22 I. C. C., 366, concluded as follows:

In view of the condition here presented, we must find that the carrier has not justified the rate situation presented in its tariff in these respects:

(1) The application of the same rates from other points upon San Francisco bay and points inland to Portland as are extended from San Francisco.

(2) The application of higher rates southbound from Portland to points inland than to San Francisco.

(3) The application of higher rates to points on the Willamette river on traffic northbound from San Francisco than are applied on traffic southbound from Portland to points on the Sacramento river.

(4) The application of rates from San Francisco that are higher to points between San Francisco and Portland than the combination of locals on Portland.

(5) The application of unreasonably higher rates at intermediate points.

Instead, however, of denying the application of the carrier, we shall give permission for it to make a further showing under its application in accordance with the views herein expressed as to the requirements of the law.

The further hearing has been had in which all parties have been fully heard, and after full consideration of the record the commission is of the following opinion:

The carrier has not justified the application of the same rates from other points upon San Francisco bay and points inland to Portland as are extended from San Francisco to Portland.

The carrier claims that it instituted this policy in 1906 to increase its loaded-car movement northward. The carrier was asked to submit a statement showing the empty-car movement northbound for a period of years prior to 1906 and subsequent thereto. It has submitted a statement of the empty-car movement northbound and southbound for the years subsequent to 1906, but has submitted no record for the years prior thereto. This statement shows that of all of the cars moving northbound between June 25 and December 31, 1906, 22 per cent. went empty, while for the same period but 3 per cent. of the cars moving southward were empty. During 1907, 40 per cent. of the cars northbound were empties and 5 per cent. of the cars moving southbound were empties. In 1908 approximately 31 per cent. of the cars moving northbound were empty and 9 per cent. of the cars moving southbound were empty. In 1909 the percentage was 34 per cent. northbound and 10 per cent. southbound. In 1910, 30 per cent. northbound, 9 per cent. southbound. In 1911, 20 per cent. northbound, 13 per cent. southbound. The great volume of lumber moving southbound during 1907, 1908, 1909 and 1910 accounts for the small percentage of empties southbound and the large percentage of empties northbound. There is nothing in the statement as to the number of empties moving northbound prior to 1906, when the rates were put in, ostensibly to give northbound lading. This showing is insufficient to satisfy us that some points intermediate between San Francisco and Portland should be given the water competitive rate that San Francisco enjoys unless the carrier is willing to extend this policy to all intermediate points.

The carrier has justified the application of higher rates southbound from Portland to points inland than to San Francisco.

In this connection the following colloquy is pertinent. The witness on the stand was the traffic manager for the Southern Pacific, and the questions were put by an examiner:

Traffic Manager—The reason we do not apply southbound to the inland points the same rates that we apply to San Francisco, while we make them the same northbound, is because there is no empty movement of cars southbound to any extent.

Examiner—Then, what you want the commission to understand is this, with respect to 1 and 2, that you make your rates from Portland to San Francisco and to Lathrop and all these other points what you can get?

Traffic Manager—Yes, sir.

Examiner—And that you are able to get these arbitraries above the San Francisco rate southbound, but that experience has demonstrated that while it would appear that you could get the same rate northbound, your northbound empty-car move-

ment was so large that it was to your interest to make those rates even more attractive than the conditions would apparently warrant, and that you have made those rates more attractive in order to get more of your business to fill up your empty cars?

Traffic Manager—That is it exactly.

The carrier has not justified the application of higher rates to points on the Willamette river on traffic northbound from San Francisco than are applied on traffic southbound from Portland to points on the Sacramento river.

The explanation of this situation given by the carrier through its traffic manager is as follows:

The rates northbound from San Francisco to points on the Willamette valley are made by combining on Portland. The rate so made to each point in the Willamette valley is different one from the other, according to the local rate in effect from Portland to points south, being a higher rate as you recede from Portland. And that applies, naturally, a higher rate to Willamette valley points northbound from San Francisco to some of the points, and from points near Portland they would be less than the Sacramento rate. Generally speaking, I would state that to be correct.

The reason the Portland and Sacramento river points rates are lower is because the rate is made by combining, if you please, on San Francisco as far as Sacramento, and that is made by taking the ocean rate of 45 cents, first class, and adding to that the old Sacramento river rate of 15 cents, making a through rate of 60 cents, and that was the maximum at all points on the Sacramento river, and therefore was not a graduated rate or a full combination of what we might call the rail rates, but of the Sacramento river rates, and therefore made to Sacramento and made to points along the peninsula, Port Costa, and those points a 60-cent rate, which I considered generally lower than most of the points have on traffic going from San Francisco northbound to Willamette valley points, because of the local rate increasing as we recede from Portland.

There has been no showing made, other than this, as to why the same policy should not be pursued by the carrier as to Willamette valley points that is pursued by the carrier as to Sacramento river points. If Portland is not entitled to any lower rates to intermediate points on the Sacramento river, then San Francisco is not entitled to any lower rates to intermediate points on the Willamette river.

The carrier has not justified the application of rates from San Francisco that are higher to points between San Francisco and Portland than the combination of locals on Portland. This matter was treated of in the previous report, and nothing was added by this record, excepting the statement that the carrier cannot defend this situation excepting as a temporary matter. The rates which have been established by the Oregon commission as local rates from Portland south are effective at present, but the order of the commission is being resisted by the carrier and the case is now in the Supreme Court. When this litigation is concluded, the carrier says, if the Oregon commission scale is upheld, the rates to intermediate points will be made on the combination of the rate to Portland plus the Oregon commission scale south.

The carrier has not justified the reasonableness of the higher rates existing at points intermediate between San Francisco and Portland or the extent to which it now discriminates against intermediate points. (24 I. C. C., 35.)

Complaint Dismissed.

Alan Wood Iron & Steel Co. v. Pennsylvania Railroad et al. Opinion by Commissioner Clark:

Complaint attacks certain features of the uniform demurrage code. Carriers have voluntarily eliminated the provision for separating cars under the average agreement into (a) box cars including refrigerator cars, and (b) freight cars of all other descriptions. That being the only change which, under this complaint, we would order, complaint dismissed. (24 I. C. C., 27.)

Escanaba Business Men's Association et al. v. Ann Arbor et al. Opinion by Commissioner Clark:

Escanaba, Mich., is not reached by break-bulk boats or by car ferry. Complaint is that rates to Escanaba from trunk line and central freight association territories are unreasonable and discriminatory. The evidence does not warrant finding the rates

unreasonable, and the absence of water service to Escanaba produces circumstances and conditions dissimilar from those which obtain at points so served. Although on the water Escanaba has the same conditions of transportation as a town inland. (24 I. C. C., 11.)

Differentials to Atlantic Seaboard Fixed.

Chamber of Commerce of the State of New York et al. v. New York Central & Hudson et al. Opinion by Commissioner Clark:

Differentials under New York on all-rail and lake-and-rail export shipments from differential territory to Baltimore should not exceed 3 cents per 100 lbs., and to Philadelphia should not exceed 2 cents per 100 lbs. on the classes and on commodities other than grain. On all-rail and lake-and-rail export shipments of grain the differentials under New York should not exceed 1.5 cents per 100 lbs. to Baltimore, and 1 cent per 100 lbs. to Philadelphia.

As to all this traffic the export rates to Boston should not be lower than to New York.

The differentials under New York from Buffalo, N. Y., Erie, Pa., and West Fairport, Ohio, to Baltimore and Philadelphia, on ex-lake grain from differential territory for export, should not to exceed two-tenths of 1 cent per bushel on barley and oats, and three-tenths of 1 cent per bushel on wheat, corn and rye.

Differentials under New York on import traffic, all-rail and lake-and-rail, from Philadelphia and Baltimore to differential territory should be no greater than those which existed in the latter part of 1908.

Import rates from Boston should not be lower than from New York. (24 I. C. C., 55.)

Discrimination Against Wichita.

Transportation Bureau of Wichita, Kans. v. St. Louis & San Francisco et al. Opinion by Chairman Prouty:

Present rates for transportation of dried and evaporated fruits in carloads from northwestern Arkansas points on the St. Louis & San Francisco Railroad to Wichita, Kans., found unduly discriminatory as compared with rates on same commodities from same points of origin to Hutchinson, Kans. (23 I. C. C., 682.)

Present rates on canned vegetables from points in Missouri and Arkansas to Wichita, Kans., not found unreasonable in themselves, but found unduly discriminatory as compared with rates on same commodities from same points of origin to Hutchinson, Kans. (23 I. C. C., 679.)

STATE COMMISSIONS.

The Washington public service commission has announced that a hearing will be held at Seattle on August 15 for the purpose of investigating the express rate situation. Express companies have been ordered to be represented at the hearing and to furnish the commission with the necessary tariffs and records.

COURT NEWS.

Representatives of the minority stockholders of the Wheeling & Lake Erie filed suit in the federal district court at Cleveland on June 15, asking permission to intervene in the receivership proceeding, and an order restraining the Wabash-Pittsburgh Terminal interests from voting their majority stock at any annual meeting.

The law of Indiana, requiring freight cabooses to be 24 ft. long and to have two four-wheel trucks, has been sustained in the lower court, at Indianapolis, which has fined the Pittsburgh, Cincinnati, Chicago & St. Louis \$100 for disobedience. The use of cabooses, as defined by the law, is not compulsory until 1914, but the company disobeyed a provision of the act in failing to make the proper changes in a caboose which was sent to the shops for general repairs. The Indiana law requiring railway officers to give "service letters" to employees who resign or are dismissed has been declared unconstitutional by the local court at Peru, in the case of the state against J. C. Sullivan, superintendent of the Wabash.

REVENUES AND EXPENSES OF RAILWAYS.

Name of road.	Mileage operated at end of period.	MONTH OF MARCH, 1912.				NINE MONTHS OF FISCAL YEAR, 1912.				MONTH OF APRIL, 1912.				TEN MONTHS OF FISCAL YEAR, 1912.			
		Operating revenues		Maintenance		Operating expenses		Net operating revenue		Outside operations, net.		Taxes.		Operating income (or loss).		Increase (or decr.) comp. with last year.	
		Total.	Freight.	Passenger.	inc. misc.	Way and structures.	Of equipment.	Traffic.	Trans- portation.	General.	Total.	(or deficit).	operations, net.				
Baltimore & Ohio Chicago Terminal....	77	\$1,938	\$139,222	\$1,938	\$139,222	\$13,328	\$125,894	\$934	\$62,719	\$3,911	\$100,951	\$38,271	\$970	\$18,206	\$21,035	\$17,913	\$17,913
Bessemer & Lake Erie.....	204 ¹	382,282	21,226	413,082	44,938	117,863	8,103	171,232	171,232	9,896	352,032	61,050	.....	9,000	52,050	—36,105	—36,105
Chicago Great Western.....	1,496	769,135	198,719	1,051,713	94,043	179,342	34,411	537,382	537,382	34,411	891,722	139,991	—328	35,090	124,573	—126,913	—126,913
Cincinnati, New Orleans & Texas Pacific	337	621,280	139,065	806,721	66,604	207,034	20,685	20,685	20,685	20,685	565,902	240,819	609	21,800	219,628	194,847	194,847
Duluth, South Shore & Atlantic.....	624 ²	172,412	58,846	243,032	31,852	31,786	7,775	98,122	98,122	13,356	182,891	60,141	—2,445	18,000	39,696	17,847	17,847
Louisiana Ry. & Navigation.....	351	124,247	18,398	153,070	28,223	15,315	6,365	65,297	65,297	5,641	120,841	32,229	.....	5,000	27,229	568	568
New Orleans, Mobile & Chicago.....	547 ³	138,214	26,203	171,605	27,700	21,301	3,536	80,992	80,992	8,800	142,329	29,276	—82	4,154	25,040	—35,942	—35,942
San Pedro, Los Angeles & Salt Lakes..	1,116 ⁴	451,043	248,210	742,566	86,609	189,212	31,310	288,224	288,224	17,477	612,832	129,734	—2,848	24,122	102,764	87,417	87,417
Richmond, Fredericksburg & Potomac..	83	101,426	97,117	221,236	30,262	28,490	3,129	89,970	89,970	5,686	157,537	63,699	.....	1,094	62,605	—22,066	—22,066
Baltimore & Ohio Chicago Terminal....	77	\$20,561	\$1,163,232	\$20,561	\$1,163,232	\$216,128	\$160,308	\$8,042	\$539,024	\$44,148	\$967,650	\$195,582	\$7,647	\$163,857	\$39,372	\$25,894	\$25,894
Bessemer & Lake Erie.....	204 ¹	\$5,460,536	262,166	5,810,473	584,397	1,171,913	74,612	1,555,380	92,430	92,430	3,478,732	2,331,741	.....	94,474	2,237,267	472,956	472,956
Chicago Great Western.....	1,496	6,730,005	2,190,795	9,676,372	1,069,725	1,466,130	423,406	4,183,939	314,087	314,087	7,457,287	2,219,085	—696	299,838	1,918,551	—255,422	—255,422
Cincinnati, New Orleans & Texas Pacific	337	5,482,074	1,356,152	7,206,185	709,483	1,589,648	180,551	2,095,236	169,490	169,490	4,744,408	2,461,777	—5,417	196,200	2,260,160	12,589	12,589
Duluth, South Shore & Atlantic.....	624 ²	1,502,589	702,246	2,326,109	354,797	267,020	84,272	914,259	86,484	86,484	1,706,832	619,277	4,002	159,666	463,613	—65,185	—65,185
Louisiana Ry. & Navigation.....	351	1,114,177	208,918	1,427,061	221,335	131,214	55,049	561,209	60,006	60,006	1,028,813	398,248	.....	43,200	355,048	114,080	114,080
New Orleans, Mobile & Chicago.....	547 ³	1,113,459	268,310	1,464,267	226,823	160,695	26,047	473,443	72,288	72,288	959,296	504,971	—472	40,046	464,453	—80,615	—80,615
San Pedro, Los Angeles & Salt Lakes..	1,116 ⁴	3,923,029	2,008,336	6,557,876	1,037,998	1,526,192	285,887	2,549,109	153,558	153,558	5,549,109	1,008,767	—34,185	221,762	752,820	—156,344	—156,344
Richmond, Fredericksburg & Potomac..	83	878,787	709,803	1,812,406	191,405	228,549	25,767	688,726	53,036	53,036	1,187,483	624,923	.....	9,847	615,076	16,665	16,665
Butte, Anaconda & Pacific.....	46	\$86,868	\$7,992	\$100,967	\$15,812	\$20,297	\$914	\$46,925	\$3,198	\$3,198	\$87,146	\$13,821	.....	\$2,000	\$11,821	\$2,749	\$2,749
Georgia, Southern & Florida.....	395	111,717	7,855	199,093	22,558	48,899	8,413	88,221	8,413	8,413	176,251	22,842	.....	9,819	13,023	—23,174	—23,174
Great Northern.....	7,345 ¹	3,636,744	1,042,149	5,066,493	879,341	3,037,777	89,812	1,459,255	212,242	212,242	3,444,242	1,724,027	—\$811	296,097	1,427,119	352,620	352,620
Lehigh & Hudson River.....	97	109,155	3,535	114,345	15,468	19,139	1,281	46,843	4,342	4,342	87,073	27,272	.....	5,000	22,272	—23,843	—23,843
Lehigh Valley.....	1,449 ²	1,462,764	357,746	1,924,229	287,947	396,287	72,243	900,614	65,631	65,631	1,722,722	201,507	—30,195	131,000	40,312	—1,224,774	—1,224,774
Louisiana Western.....	208 ³	102,762	52,005	164,277	20,082	22,002	7,813	57,819	6,144	6,144	113,860	50,417	483	6,534	44,366	—11,702	—11,702
Louisville & Nashville.....	4,728 ⁴	3,461,520	963,313	4,729,591	794,664	892,430	89,945	1,623,115	95,569	95,569	3,495,723	1,233,868	2,138	150,617	1,085,389	304,706	304,706
Morgan's La. & Tex. R. R. & S. Co..	404 ⁵	238,577	101,496	370,938	63,484	56,308	13,920	164,243	11,368	11,368	309,323	61,615	—2,214	17,762	41,639	—39,365	—39,365
New Orleans & North Eastern.....	196	250,970	48,978	322,546	38,643	63,649	9,955	122,645	13,243	13,243	248,135	74,411	46	8,250	66,207	—9,557	—9,557
New Orleans Great Northern.....	282	88,082	24,303	122,822	14,834	19,811	2,147	39,642	7,031	7,031	83,465	39,357	—91	1,750	37,516	—8,376	—8,376
New Orleans, Mobile & Chicago.....	547 ³	127,961	21,523	159,534	36,458	21,291	3,255	79,036	7,276	7,276	147,316	12,218	—74	4,154	7,990	—37,426	—37,426
Spokane, Portland & Seattle.....	556 ⁷	218,168	129,010	371,172	47,991	58,949	7,848	92,100	12,009	12,009	218,897	151,275	890	53,400	98,765	—107,647	—107,647
Butte, Anaconda & Pacific.....	46	\$802,428	\$85,678	\$947,704	\$104,647	\$179,790	\$7,232	\$431,170	\$29,456	\$29,456	\$752,295	\$195,409	.....	\$21,764	\$173,645	\$29,148	\$29,148
Georgia, Southern & Florida.....	395	1,090,546	700,470	2,074,497	210,881	407,176	73,511	809,536	92,040	92,040	1,593,144	481,353	.....	102,256	379,097	—24,971	—24,971
Great Northern.....	7,345 ¹	39,535,213	11,254,956	54,662,378	6,129,507	6,509,737	904,896	15,194,333	1,105,846	1,105,846	29,844,319	24,818,059	87,202	2,794,474	22,110,787	4,611,570	4,611,570
Lehigh & Hudson River.....	97	1,299,445	40,245	1,356,935	148,720	190,243	12,430	472,159	48,464	48,464	872,016	484,919	.....	36,500	448,419	32,858	32,858
Lehigh Valley.....	1,449 ²	25,996,834	3,889,414	30,956,631	3,511,757	5,466,342	799,271	10,754,622	681,176	681,176	21,213,770	9,742,861	—253,788	1,194,700	8,294,373	—1,498,143	—1,498,143
Louisiana Western.....	208 ³	1,001,339	541,445	1,629,310	194,747	281,176	77,544	550,094	65,175	65,175	1,168,736	460,574	.....	17,875	392,190	—73,073	—73,073
Louisville & Nashville.....	4,728 ⁴	34,212,351	10,203,038	47,214,648	7,217,577	8,332,533	972,198	15,306,874	910,388	910,388	32,739,570	14,475,078	—23,690	1,494,500	12,956,888	970,167	970,167
Morgan's La. & Tex. R. R. & S. Co..	404 ⁵	2,904,643	1,050,864	4,215,239	550,722	558,309	137,061	1,712,638	122,643	122,643	3,081,373	1,133,866	—19,565	185,062	929,239	—309,291	—309,291
New Orleans & North Eastern.....	196	2,399,065	528,603	3,147,765	303,559	593,668	92,064	1,187,373	118,656	118,656	2,295,320	852,445	—7,752	86,671	758,022	—118,660	—118,660
New Orleans Great Northern.....	282	962,627	282,540	1,344,310	202,462	181,508	25,521	432,208	73,174	73,174	915,873	428,437	—734	17,923	409,780	—84,334	—84,334
New Orleans, Mobile & Chicago.....	547 ³	1,241,420	289,833	1,623,802	263,281	181,986	29,303	552,479	79,564	79,564	1,106,613	517,189	—546	44,200	472,443	—118,041	—118,041
Spokane, Portland & Seattle.....	556 ⁷	2,328,340	1,435,802	4,016,196	424,938	401,311	71,198	1,026,931	114,114	114,114	2,038,492	1,977,704	11,419	420,605	1,568,518	—57,970	—57,970

Operated in previous period—¹ 205; ² 611; ³ 404; ⁴ 1,105. — Indicates Deficits, Losses and Decreases.Operated in previous period—¹ 7,329; ² 1,431; ³ 207; ⁴ 4,591; ⁵ 405; ⁶ 404; ⁷ 551. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF EXPRESS COMPANIES AS REPORTED TO THE INTERSTATE COMMERCE COMMISSION.

MONTH OF NOVEMBER, 1911.									
Miles of line covered.		Gross receipts from operation.		Less express privileges.		Total operating revenues.		Operating expenses.	
Steam roads.	Other lines.	Express revenue.	Dr.	Dr.	Dr.	Dr.	Dr.	Traffic.	Trans- portation.
Adams Express Co.	32,946 ¹	4,843	\$3,012,814	\$3,048,955	\$1,584,896	\$1,464,059	\$74,720	\$7,364	\$1,110,986
American Express Co.	54,688 ²	1,910	3,741,467	3,884,527	1,727,351	2,157,176	45,516	31,072	1,501,136
Canadian Express Co.	6,122 ³	830	244,824	250,426	119,297	131,129	6,620	790	95,386
Canadian Northern Express Co.	3,551 ⁴	22	55,545	57,779	22,218	35,561	1,69	457	15,228
Globe Express Co.	2,904 ⁵	.....	61,635	62,267	31,604	30,663	1,011	1,607	24,612
Great Northern Express Co.	8,497 ⁶	399	252,646	253,885	153,626	100,259	1,468	1,400	69,604
National Express Co.	1,422	218	105,826	106,394	40,650	65,744	895	.....	50,277
Northern Express Co.	7,310 ⁷	315	242,402	246,000	125,661	120,339	1,409	3,928	81,162
Pacific Express Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Southern Express Co.	31,936 ⁸	821	1,379,585	1,406,584	665,712	740,872	28,915	8,342	445,468
United States Express Co.	28,965 ⁹	3,954	1,841,866	1,869,549	827,566	1,041,983	30,414	14,352	828,099
Wells, Fargo & Co.	63,675 ¹⁰	17,339	2,756,106	2,809,818	1,352,840	1,456,978	53,524	21,633	1,044,125
Western Express Co.	4,892 ¹¹	4	102,156	103,834	52,135	51,699	1,097	2,845	36,228
FIVE MONTHS OF FISCAL YEAR, 1912.									
Adams Express Co.	32,946 ¹	4,843	\$13,879,482	\$14,046,195	\$7,152,279	\$6,893,916	\$359,953	\$37,996	\$5,352,865
American Express Co.	54,688 ²	1,910	17,663,860	18,426,107	8,586,043	9,840,064	257,600	146,167	7,307,292
Canadian Express Co.	6,122 ³	830	1,261,123	1,287,866	608,023	679,843	30,366	5,006	475,086
Canadian Northern Express Co.	3,551 ⁴	22	252,564	261,067	93,619	147,448	1,074	2,052	70,045
Globe Express Co.	2,904 ⁵	.....	364,345	364,345	181,593	182,752	3,510	8,214	125,692
Great Northern Express Co.	8,497 ⁶	399	1,269,053	1,275,126	768,199	506,927	8,789	6,994	343,105
National Express Co.	1,422	218	555,890	558,164	215,067	343,097	4,599	247,368	267,730
Northern Express Co.	7,310 ⁷	315	1,319,032	1,336,008	679,278	656,730	7,232	16,739	400,584
Pacific Express Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Southern Express Co.	31,936 ⁸	821	5,774,905	5,888,305	2,800,045	3,088,260	103,411	47,361	2,044,398
United States Express Co.	28,965 ⁹	3,954	8,830,486	8,968,441	4,082,216	4,886,225	165,474	81,750	4,063,300
Wells, Fargo & Co.	63,675 ¹⁰	17,339	12,898,829	13,137,807	6,227,919	6,909,888	253,708	123,011	4,989,370
Western Express Co.	4,892 ¹¹	4	483,237	491,439	252,331	239,108	5,446	14,634	176,112

†Operations ceased July 31, 1911. Business disbanded.

‡Operated in previous period: Steam Roads—132,659; 255,042; 36,964; 4,369; 2,844; 7,839; 7,601; 31,631; 28,807; 46,252; 3,506.

Other Lines—13,727; 2,408; 381; 7261; 816; 3,762; 4,594.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Fred A. Miller, formerly president of the Laramie, Hahns Peak & Pacific, has resigned as president, and has been appointed receiver of the road.

George K. Saunders has been appointed assistant claim agent of the International & Great Northern at Palestine, Tex., succeeding J. M. Sellers, deceased.

T. J. Guilfoil has been appointed auditor of the Clinton & Oklahoma Western, with office at Clinton, Okla., succeeding W. J. Aycock, who has been made general freight and passenger agent.

M. Donaldson, superintendent of the Grand Trunk, at Ottawa, Ont., has been appointed vice-president and general manager of the Grand Trunk Pacific in charge of the lines West of Fort William, Ont., with headquarters at Winnipeg, Man.

The officers of the Eagles Mere Railroad are now as follows: H. Laussat Geyelin, president; William K. DeVictor, vice-president; S. S. Garwood, secretary, and E. S. Chase, treasurer, with headquarters at Eagles Mere, Pa.

Joseph M. Bryson, who was recently appointed general counsel of the Missouri, Kansas & Texas, as has been announced in these columns, has been appointed also general counsel of the Texas Central, the Wichita Falls & Northwestern, the Wichita Falls & Northwestern of Texas, and the Wichita Falls & Southern, with office at St. Louis, Mo.

J. S. Pyeatt, vice-president and general superintendent of the St. Louis, San Francisco & Texas and the Fort Worth & Rio Grande at Fort Worth, Tex., has been appointed vice-president and general manager of the New Orleans, Texas & Mexico, the Beaumont, Sour Lake & Western, the Orange & Northwestern and the St. Louis, Brownsville & Mexico, with office at Houston, Tex., succeeding J. H. Elliot, who has been transferred to Fort Worth, in place of Mr. Pyeatt.

Operating Officers.

J. F. Goodrich has been appointed assistant superintendent of the Phoenix and Hayden divisions of the Arizona Eastern, with office at Phoenix, Ariz.

G. B. Moore has been appointed general manager of the Washington Western, with headquarters at Three Lakes, Wash., succeeding C. W. Hole, resigned.

J. P. Freeman, assistant trainmaster of the Lake Shore & Michigan Southern at Collinwood, Ohio, has been appointed trainmaster, with office at Cleveland, Ohio.

P. G. Walton has been appointed assistant superintendent of the Ozark division of the St. Louis & San Francisco, with office at Thayer, Mo., succeeding B. F. Hunter, deceased.

Osgood F. Barnes, division engineer of the Erie Railroad at Susquehanna, Pa., has been appointed also trainmaster of the Delaware and Jefferson divisions, with headquarters at Susquehanna.

H. H. Baker, assistant superintendent of dining cars and restaurants of the Pennsylvania, has been appointed superintendent of dining cars and restaurants, with headquarters at New York, succeeding John F. Trout, deceased.

E. J. Parrish has been appointed joint superintendent of telegraph of the New York, Chicago & St. Louis and the Western Union Telegraph Company, with office at Cleveland, Ohio, succeeding G. C. Todd, whose appointment as superintendent of the Cleveland division of the N. Y. C. & St. L. has been announced in these columns.

The Lake Superior division of the Canadian Pacific will in future be operated in three districts, as follows: The First district includes Temiskaming, Kipawa, Webbwood, Algoma, Sudbury, North Bay and Cartier subdivisions, also all terminals connected therewith except Cartier and Muskoka; the Second district includes Chapleau and White River subdivisions, and Cartier terminal, and the Third district includes Schreiber and Nipigon subdivisions, and White River terminal.

George Spencer, superintendent at Sudbury, Ont., is in charge of the First district. T. Collins, assistant superintendent at Smith Falls, Ont., has been appointed superintendent, with headquarters at Chapleau, Ont., in charge of the Second district, and J. H. Hughes, superintendent at White River, Ont., is now in charge of the Third district, with headquarters at Schreiber.

Traffic Officers.

W. C. Quillian has been appointed soliciting agent of the Central of Georgia, with office at Albany, Ga., succeeding J. E. Thayer, resigned.

E. R. Leis has been appointed general agent of the Atchison, Topeka & Santa Fe, with office at Salt Lake City, Utah, succeeding C. F. Warren, deceased.

J. F. McMahon has been appointed contracting freight agent of the Illinois Central, with headquarters at Dubuque, Iowa, succeeding E. W. Stafford, promoted.

Hal S. Ray, assistant general passenger agent of the First district of the Rock Island Lines at Chicago, will have his office removed to Des Moines, Iowa, effective July 1.

A. G. Busch, commercial agent of the Louisiana & Arkansas at Shreveport, La., has been appointed general agent, with office at Shreveport, and his former title has been abolished.

C. Hartigan, general passenger agent of the Rutland Railroad at Rutland, Vt., has been appointed assistant general passenger agent of the Lake Shore & Michigan Southern, with office at Chicago.

F. P. Sutherland has been appointed traffic manager of the Clinton & Oklahoma Western, with office at Clinton, Okla., succeeding C. J. Turpin; and W. J. Aycock, auditor, has been appointed general freight and passenger agent.

J. R. Keefer, assistant general passenger agent of the Pacific Coast Steamship Company, with office at San Francisco, Cal., has been assigned to special duties under the direction of the passenger traffic manager, and his former position has been abolished.

Fred H. Behring, assistant general freight agent of the Southern Railway, at Louisville, Ky., has been transferred, as assistant general freight agent, to St. Louis, Mo., succeeding C. D. Morris, deceased, and E. R. Oliver succeeds Mr. Behring, with office at Louisville.

W. R. Wyatt, freight soliciting agent of the Southern Railway, at Mobile, Ala., has been appointed traveling freight agent, with office at Montgomery, succeeding J. A. McWilliams, transferred. C. S. Shawhan succeeds Mr. Wyatt, with office at Mobile, and J. O. Smith has been appointed freight soliciting agent, with office at Knoxville, Tenn.

H. W. Steinhoff, Michigan passenger agent of the Chicago, Milwaukee & St. Paul at Detroit, Mich., has been appointed district passenger agent, with office at Detroit. A. L. Eidemiller, traveling passenger agent at St. Paul, Minn., has been appointed traveling passenger agent, with office at Indianapolis, Ind., and Leslie M. Jones succeeds Mr. Eidemiller.

B. H. Hartley, commercial agent of the Seaboard Air Line, at Atlanta, Ga., is now in charge of the soliciting freight traffic in the Atlanta territory, and W. H. L. Nelms, commercial agent at Atlanta, has been appointed contracting freight agent, both with offices at Atlanta. G. C. Poole, traveling freight agent at Raleigh, N. C., has been appointed commercial agent, with office at Greenville, S. C., succeeding C. S. Allen, resigned to go to another company, and Andrew Syme succeeds Mr. Poole, with office at Raleigh.

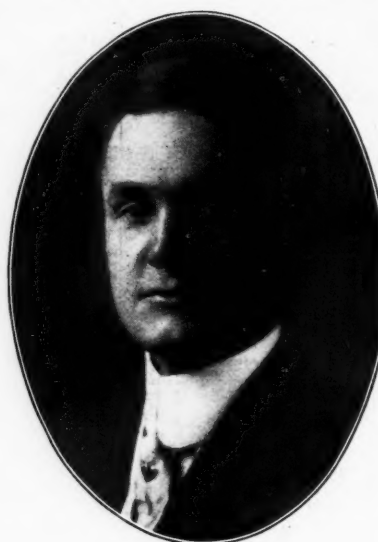
Engineering and Rolling Stock Officers.

Frank Rusch, district master mechanic of the Chicago, Milwaukee & Puget Sound at Tacoma, Wash., has been appointed acting general master mechanic, with office at Tacoma, succeeding N. M. Maine, deceased.

M. A. Box, general roadmaster of the Southern division of

the Kansas City Southern and of the Texarkana & Fort Smith at Texarkana, Tex., has been appointed general roadmaster of the Kansas City Terminal and Northern divisions of the Kansas City Southern and of the Arkansas Western, with office at Pittsburg, Kan., succeeding Patrick Gratton, resigned. R. H. Gaines, division engineer of the Kansas City Southern and chief engineer of the Texarkana & Fort Smith at Texarkana, has assumed the duties of Mr. Box.

Samuel Garver Thomson, whose appointment as superintendent of motive power and rolling equipment, of the Philadelphia & Reading, with headquarters at Reading, Pa., has been announced



S. G. Thomson.

in these columns, was born on November 19, 1875, at Cumberland, Md., and was graduated from the Lawrenceville school in 1894, and from Princeton University in 1898. In October of the same year he began railway work with the Pennsylvania Railroad as special apprentice at the Altoona, Pa., shops, and he completed his apprenticeship in 1902. The following year he was general foreman of the Bedford shops at State Line, and in November, 1904, he was assistant master mechanic of the Harrisburg shops. Mr. Thomson was appointed assistant engineer of motive power of the Buffalo & Allegheny Valley division, now the Northern division, with headquarters at Buffalo, in February, 1906, and in April, 1908, was transferred in the same capacity to the office of the assistant to general manager at Philadelphia, Pa., of the same road. He went to the Philadelphia & Reading as assistant engineer of motive power on November 15, 1909, and in January, 1912, was made acting superintendent of motive power and rolling equipment of the same company, which position he held at the time of his recent appointment as superintendent of motive power and rolling equipment, as above noted.

T. J. Burns, whose appointment as assistant superintendent of motive power of the Michigan Central, with office at Detroit, Mich., has been announced in these columns, was born



T. J. Burns.

July 24, 1869, at Hillsdale, Mich. He is a graduate of the Bay City, Mich., high school and of Assumption College at Sandwich, Ont., and he took a postgraduate course at Grand Seminaire, Montreal, Que. He began railway work with the Michigan Central at Bay City, Mich., and after working one year in the track department he entered the locomotive and car department. In 1902 he was made chief clerk of the locomotive department at Jackson, Mich., and three years later was transferred to Detroit as chief clerk of the locomotive and car department. He was appointed assistant to the superintendent of motive power in 1909, which title he held until his recent promotion to assistant superintendent of motive power.

James F. Walsh, general superintendent of motive power of the Chesapeake & Ohio, with office at Richmond, Va., is to retire from the active duties of that office on July 1. He may continue with the road in a consulting capacity. Mr. Walsh was born in March, 1857, at Cleveland, Ohio, and began railway work in 1871, on the Cleveland, Columbus, Cincinnati & Indianapolis, now a part of the Cleveland, Cincinnati, Chicago & St. Louis. From 1871 to 1892 he was consecutively apprentice, locomotive fireman, locomotive engineer, and shop foreman. Mr. Walsh left railway work in 1892 to become mechanical expert for the Galena Oil Company, but returned to the railway service ten years later as superintendent of motive power on the Chesapeake & Ohio. He held the position until May, 1910, when he was promoted to general superintendent of motive power.



J. F. Walsh.

OBITUARY.

David B. Hunt, formerly auditor of the Mexican Central and the Union Pacific railways, and recently in the auditing department of the Standard Oil Company, died at Northampton, Mass., on June 18.

John H. Wicks, special agent of the New York Central & Hudson River, died on June 18, at his home at Tarrytown, N. Y., at the age of 61. Mr. Wicks has been in the service of the New York Central for 41 years, having entered the service as a brakeman. He held various positions until he was appointed assistant superintendent of the Hudson division. Some time ago he was made special agent in charge of examinations on the rules.

Major Eli H. Janney, inventor of the Janney car coupler, died at his home in Alexandria, Va., on Monday last, in his eightieth year. Major Janney was a field quartermaster on the staff of General Robert E. Lee in the civil war. The contour lines of the Janney coupler were adopted by the Master Car Builders' Association, and thus are now the well known "M. C. B. standard," used everywhere throughout the United States.

Charles E. Satterlee, secretary and treasurer of the Texas & Pacific, with office at New York, and president of the Opelousas, Gulf & Northeastern, died on June 17, at his summer home, Atlantic Highlands, N. J. Mr. Satterlee was born in New York 80 years ago, and has been in railway service since 1871. He was first accountant on the Texas & Pacific, and in 1875 was appointed secretary. Since 1881 he has been secretary and treasurer and a director of the road.

The government of Malay States has voted \$300,000 for railway construction during the present year. The most important line to be built is that from Pahang to Kelantan, which is ultimately intended to connect with the Siamese system. This line will be of great importance to the state of Kelantan. Another projected line will enter Kedah.

The opening of the Arica & La Paz railway, which runs from Chili to Bolivia will, in all probability, take place on August 6 next, this being the anniversary of the declaration of the constitution of Bolivia. It had been suggested that the railway should be opened on the anniversary of the independence of Chili, but the Chilean government, with a desire to pay tribute to Bolivia, proposed August 6 as the date.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE CENTRAL OF GEORGIA is in the market for 15 mikado locomotives.

THE GRAND TRUNK has ordered 19 Pacific type locomotives from the Baldwin Locomotive Works.

THE CENTRAL OF NEW JERSEY has ordered 5 ten-wheel locomotives from the Baldwin Locomotive Works.

THE GEORGIA SOUTHERN & FLORIDA is in the market for 6 consolidation freight locomotives and 4 switching locomotives.

THE CENTRAL IRON & COAL COMPANY has ordered 1 six-coupled double-ender locomotive from the Baldwin Locomotive Works.

THE HOUSTON BELT & TERMINAL COMPANY has ordered 2 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE ILLINOIS CENTRAL is in the market for 50 mikado locomotives, 20 Pacific type locomotives and 18 switching locomotives.

THE PENNSYLVANIA RAILROAD has ordered 21 freight locomotives and 10 switching locomotives from the company's shops at Altoona, Pa.

THE SOUTHERN RAILWAY is in the market for 30 mikado locomotives, and 10 Pacific type locomotives. All these locomotives will be equipped with superheaters.

THE VULCAN IRON WORKS, Wilkesbarre, Pa., has received orders for locomotives as follows: 6 locomotives, Pinkerton Construction Company, Philadelphia, Pa.; 1 saddle-tank switching locomotive, Baltimore & Ohio; 2 four-wheel saddle-tank locomotives, Chittanooga Iron & Coal Company, Chattanooga, Tenn.; 1 locomotive, Lathrop & Shea, Buffalo, N. Y.; 1 four-wheel switching locomotive, Indianapolis Sand & Gravel Company.

CAR BUILDING.

THE KANAWHA & MICHIGAN is in the market for 3 passenger cars.

THE PENNSYLVANIA RAILROAD has ordered 875 refrigerator cars from the company's shops at Altoona, Pa.

THE METROPOLITAN WEST SIDE ELEVATED RAILWAY COMPANY, Chicago, is in the market for 50 steel passenger cars.

THE GEORGIA SOUTHERN & FLORIDA is in the market for 2 steel-underframe mail cars, 5 steel-frame coaches, 4 steel-underframe express cars and 240 freight cars.

THE CENTRAL OF NEW JERSEY has ordered 1,500 freight cars as follows: 500 from the Cambria Steel Company; 500 from the American Car & Foundry Company, and 500 from the Standard Steel Car Company.

THE SOUTHERN RAILWAY is in the market for 20 first class steel-frame passenger coaches, 5 steel-underframe combination baggage and express cars, 5 steel-underframe combination baggage and mail cars, 2 dining cars, 200 steel-underframe ventilated box cars, 150 steel-underframe automobile cars, and 100 steel flat cars. This is in addition to 4 dining cars recently ordered.

IRON AND STEEL.

THE BOSTON & MAINE has given an order to the Pennsylvania Steel Company for 300 tons of bridge material.

THE SOUTHERN RAILWAY is in the market for 26,200 tons of rails. These will be bought largely in the Birmingham district.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

The Southern Pacific has appropriated \$125,000 for installing automatic block signals on the Lucin cut-off across the Great Salt Lake. Alternating current apparatus will be used; and the plan covers a distance of 20 miles across the fills on the east side and approximately 24 miles on the west side of the trestle.

Supply Trade News.

Edgar Lewis has resigned as representative of the P. & M. Company of Chicago on account of illness.

The Western Electric Company has opened a branch office and a large warehouse at Houston, Tex. The sales agent is H. P. Hess.

J. E. Chisholm has opened an office at 355 Old Colony building, Chicago, and will handle railway specialties. Mr. Chisholm has been sales manager of the Chicago Steel Car Company for the past three years, and was formerly mechanical superintendent of the Chicago Great Western.

J. R. Flynn, Jr., who has been on the Panama Canal since 1905, has resigned as mechanical engineer for the Isthmian Canal Commission, and has been elected president of Lines, Flynn & Company, Incorp., dealers in railway and contractors' equipment, with office at 50 Church street, New York.

John S. Quist, formerly in the locomotive department of the Union Pacific, has become associated with the M. M. Rogers Company, of Chicago, maker of the Rogers improved indestructible journal packing. Mr. Quist will have charge both of the manufacturing and sales departments, and his office will be at the factory, 6422 Stony Island avenue.

The American Mason Safety Tread Company, Boston, Mass., has purchased from the Quincy, Manchester, Sargent Company, Chicago, all patents, machinery, selling rights, etc., connected with the Stanwood steel car steps and treads. The Stanwood step has been used by street, elevated and steam railways for a number of years. It is composed of a number of thin strips of steel, crimped so as to form corrugations which, when the strips are assembled, produce a series of hexagonal openings.

Officers of the Roadmasters' & Maintenance of Way Association are expecting a very large attendance at the convention, to be held at Hotel Statler, Buffalo, September 10. The number of exhibits is likely to be correspondingly large, and Mr. Preston, secretary of the Track Supply Association (637 Exchange Building, Chicago), asks all prospective applicants to make their wishes known without delay. He has only 5,000 square feet of space at his disposal. There will be a meeting July 10 to allot space.

H. M. Estabrook, whose election as president of the Barney & Smith Car Company, has been announced in these columns, was born in Cambridge City, Ind., in 1864, and received his education in the public schools,



H. M. Estabrook.

graduating from the Terre Haute High School in the class of 1883. He then went to Oswego, N. Y., to study stenography, and soon after became stenographer in the motive power department of the New York, West Shore & Buffalo, now the West Shore, under R. H. Soule and James M. Boone. In August, 1885, he went to Dayton, Ohio, as stenographer for the Barney & Smith Car Company. After filling various positions he was made general assistant to the superintendent, and was appointed assistant superintendent in December, 1897. In January, 1900, he was appointed superintendent, and in June 1906, he was elected a member of the board of directors and was also elected second vice-president and general superintendent. On November 10, 1908, he was elected vice-president and general superintendent, and now becomes president of the company. Arthur J. Stevens, whose election as first vice-president and general man-

ager of the Barney & Smith Car Company was announced last week, has been in charge of the lumber department of that company for the last four years, having been appointed manager April 1, 1908. On October 21, 1909, Mr. Stevens was appointed manager of purchases and transportation, which included the purchase of all materials and lumber and transportation, including all inbound and outbound shipments; and in June of the following year he was elected to the board of directors and also second vice-president. At the recent annual meeting of the company he was elected vice-president and general manager. Mr. Stevens was born on May 23, 1871,



A. J. Stevens.

at Dayton, Ohio. He received his early education in the public schools and at Cooper Seminary in Dayton, which was founded about the year 1834 by Eliam E. Barney, the founder of the Barney & Smith Car Company. After finishing his course at the seminary he took a college course at Denison University, at Granville, Ohio, and after leaving college he entered the lumber business. He entered the service of the Barney & Smith Car Company as assistant lumber buyer on December 26, 1897, later when he was appointed manager he succeeded his father, James

H. Stevens, who retired after a continuous service with the car company of over 46 years. In March, 1905, the company having bought large timber interests, including a saw-mill and railway in southern Georgia, there was organized the Milltown Lumber Company, Milltown, Ga., and the Milltown Air Line Railroad, of both of which companies Mr. Stevens was elected president, which offices he now holds. Mr. Stevens was a grandson of Ansel E. Stevens, who was with the car company in its earliest years, having entered its service in 1852. He was associated with the elder Mr. Barney in the early days of the company, and continued in its service until 1882. Mr. Stevens' grandmother, Mrs. Ansel E. Stevens, was a sister of E. E. Barney, founder of the car company and his father, J. H. Stevens, and his grandfather, A. E. Stevens, have given to the car company an aggregate service of over 90 years, having had complete charge of its very extensive lumber interests since the founding of the company. Under the direction of Mr. Stevens, the car company has become an importer direct of fancy woods from all corners of the globe.

TRADE PUBLICATIONS.

WATER TUBE BOILERS.—Egbert R. Morrison, Sharon, Pa., has published an article on Morrison Water Tube Boilers, containing diagrams, brief descriptions, and reasons why these boilers are safe, economical and efficient.

TURBINES.—The Kerr Turbine Company, Wellsville, N. Y., has published bulletin No. 24 on the Economy steam turbine for belt drive. This bulletin shows installations, describes the construction of these turbines and points out their advantages.

DIGGING MACHINERY.—The Hayward Company, New York, has issued a small pamphlet describing its buckets and digging machinery and giving many illustrations showing their use in actual service on particularly difficult jobs, together with data describing the character of the work.

TRACK TOOLS.—Fairbanks, Morse & Company has issued a new catalog covering its line of railway supplies, including the Chisholm & Moore chain hoists, the Duff-Barrett jacks and similar lines handled exclusively for the railway trade by Fairbanks, Morse & Company, Samson and Badger car movers, a complete line of oilers and oil cans, the Sheffield track drill, shovels, track tools, rail benders, etc.

Railway Construction.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE; COAST LINES.—An officer writes that a contract has been given to the Sharp-Fellows Contracting Company, Los Angeles, Cal., for building the first six miles of second track between Keenbrook, Cal., and San Bernardino. All other work will be taken care of by the company's forces. No change of line will be made, as the second track will parallel the present main line. G. W. Harris, chief engineer, Los Angeles, Cal.

ATLANTA & MACON (Electric).—This company has asked permission to mortgage its property, the proceeds to be used to build a line from Atlanta, Ga., southeast to Macon, about 80 miles. The company was recently incorporated with \$100,000 capital. G. Cowan, Chicago; H. M. Scott and R. S. Parker, Atlanta, are interested. (April 19, p. 940.)

CANADIAN PACIFIC.—On the Raymond section, the Coutts' sub-division has been opened for business from Montana, Alta, south via Stirling to Coutts, about 65 miles, and the Cardston sub-division has been opened for business from Stirling southwest to Cardston, 47 miles. On the Ontario division, the Coldwater sub-division, formerly in operation between Coldwater Junction, Ont., and Coldwater, has been extended from Coldwater to Port McNicoll, Victoria Harbor, 12 miles, and the eastern terminal port of the Great Lakes steamship service has been changed from Owen Sound to Port McNicoll.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—On account of the increased traffic over this road in connection with the Southern Railway and the Alabama Great Southern, double-tracking work is to be carried out between Erlanger, Ky., and Williamstown, 29½ miles. This will give the company about 37 miles of double-track south from the Ohio river. To facilitate the movement of trains into and out of Chattanooga, Tenn., the line from Boyce to Citico is to be double-tracked, and in addition the freight yard at Oakdale, just north of Harriman Junction, is to be enlarged to give it an additional capacity of 135 cars. C. Dougherty, chief engineer, Cincinnati, Ohio. (June 14, p. 1364.)

COLUMBUS, CHATTAHOOCHEE VALLEY & ATLANTA.—Incorporated in Georgia with \$500,000 capital, by residents of Columbus, Ga. The plans call for building from Columbus, south to a point on the Gulf of Mexico. An extension will probably be built to Atlanta.

EASTERN ILLINOIS & PEORIA.—Incorporated in Illinois to build from Peoria, Ill., south to St. Elmo. The incorporators include: F. R. Austin, Evansville, Ind.; R. A. Dennis, F. S. Nicholson, K. L. Richmond, and F. W. Krohn, all of Chicago.

FREDERICTON & GRAND LAKE COAL & RAILWAY COMPANY.—A. E. Trites & Son, Gibson, N. B., who have the general contract to build between Fredericton, N. B., and Minto, have sublet contracts for clearing as follows: To Luther Taylor, to H. Burns, to J. W. Steeves, and to Barnes & Nichols. For grading work: to John Mavor, to Patterson Brothers, to Mavor Brothers, to J. E. Armstrong, to McPhail & Baird to Cooke, Kitchen & Company, to McLeod & McNeill, to William Rockford, and to Sutton & McLane. Some of the grading will be carried out by the general contractors, and additional contracts are yet to be let. Contracts for the masonry work on bridges have been let for the Nashwaak and Little River bridges, and for concrete culverts and a number of stations to D. C. Burpee & Son, to McLaggan & McVain, and for Bailey brook arch, and for five other arches, and culverts to J. Maxwell. H. W. D. Armstrong, chief engineer, Fredericton. (May 17, p. 1139.)

GREAT NORTHERN.—A new branch has been opened for business on the Minot division from Stanley, N. D., northwest to Wildrose, 52 miles.

The Midland of Manitoba, which provides the Great Northern with an entrance into Winnipeg, Man., has been opened for business.

KNOXVILLE, SEVIERVILLE & EASTERN.—According to press reports, work is to be started soon on an extension from Sevierville, Tenn., to the east side of Sevier county. W. A. Seymour, chief engineer, Knoxville, Tenn.

LOUISVILLE & NASHVILLE.—A new branch has been opened for business on the Cumberland Valley division from Ponza, Ky., to Colmar, about 6 miles.

MAINE CENTRAL.—The extension from Mainstream, Me., west to Harmony will be opened in July, or in August. It is reported that a further extension is contemplated from Harmony north to Greenville, 36 miles. Surveys were made for such an extension by the Sebasticook & Moosehead, before it was taken over by the Maine Central. T. L. Dunn, chief engineer, Portland, Me. (February 2, p. 221.)

MERIDIAN & MEMPHIS.—According to press reports, a contract has been given to the Morey-Faulhauber Company, St. Louis, Mo., to build from Meridian, Miss., northeast to Union, about 30 miles. S. A. Neville, president, Meridian. (April 19, p. 941.)

MIDLAND OF MANITOBA.—See Great Northern.

MISSOURI, OKLAHOMA & GULF.—The Railroad Commission of Texas has approved an issue of bonds to cover the cost of building 10 miles from Denison, Tex., north to the Oklahoma state line. Work on the proposed extension southeast from Denison will be started soon. J. J. Harrison, chief engineer, Muskogee, Okla.

NORTHWESTERN PACIFIC.—The Northern division has been extended from Shively, Cal., to South Fork, for a distance of eight miles.

SEBASTICOOK & MOOSEHEAD.—See Maine Central.

SOUTHERN PACIFIC.—On the Portland division a new line has been opened for business from Natron, Ore., east to Oak Ridge, 33½ miles.

SOUTHERN RAILWAY.—This company expects to place about 28 miles of second-track in service at once. This is part of the section of 36 miles of double-tracking work now being carried out on the main line north of Atlanta, Ga., between Crosskeys and Gainesville. The freight yard at North Birmingham, Ala., is to be further developed. W. H. Wells, chief engineer construction, Washington, D. C.

ST. LOUIS, BROWNSVILLE & MEXICO.—The Port O'Connor branch has been extended from Bloomington, Tex., north to Victoria, 13½ miles. (January 5, p. 37.)

UNION PACIFIC.—On the Nebraska division, the Kearney branch has been extended from Callaway, Neb., west to Stapleton, about 37 miles.

WASHINGTON WESTERN.—This road has been opened for business from Machias, Wash., south via Harnett to Woodruff, 12 miles. There is also a branch from Harnett east to Williams Mill. C. W. Hole, general manager, Three Lakes, Wash. (May 24, p. 1181.)

RAILWAY STRUCTURES.

BAINBRIDGE, GA.—According to press reports, the Atlantic Coast Line will build a concrete bridge over Flint river at Bainbridge, and will also build a long concrete trestle.

COLUMBUS, GA.—The Southern Railway will build a new brick freight house, 40 ft. x 400 ft., at Columbus.

INDIANAPOLIS, IND.—It is reported that the Cleveland, Cincinnati, Chicago & St. Louis will enlarge its Indianapolis yards and expend \$175,000 in erecting additional shop buildings at Beech Grove.

OTTAWA, ONT.—The National Transcontinental (Grand Trunk Pacific) has received bids for building 25 stations and two terminal stations on the line between Cochrane, Ont., and Superior Junction. The cost of the improvements will be between \$250,000 and \$300,000.

Construction work on the line from Kalgoorlie, Australia, to Port Augusta will be begun immediately. Pending the arrival of the rails, the grading work will be pushed forward, and when the track-laying machinery is ready, and the rails are on the spot, it is expected that track will be laid at the rate of at least two miles a day.

Railway Financial News.

BOSTON & ALBANY.—The New York Public Service Commission, Second district, has authorized this company to issue \$1,000,000 twenty-five-year 4½ per cent. improvement bonds to be sold at not less than par, and to be guaranteed by the New York Central & Hudson River. The Massachusetts railway commission has already authorized this issue.

Kidder, Peabody & Company; R. L. Day & Company, and Estabrook & Company, all of Boston, have bought these bonds, and are selling them at 105.

BOSTON & MAINE.—See Connecticut River.

BRIDGTON & SACO RIVER.—See New York, New Haven & Hartford.

BROOKLYN RAPID TRANSIT.—The bankers who are to underwrite the financing of the B. R. T. subways and elevated lines which have been approved by the New York Public Service Commission are Kuhn, Loeb & Company and the Central Trust Company, both of New York, and Kidder, Peabody & Company, Boston.

It is understood that the plan to place a mortgage for \$100,000,000 on the property of a subsidiary company which is to be formed has the unofficial approval of the New York Public Service Commission. It is expected that the bonds secured by this mortgage will be collateral for short-term notes which will be sold to the public.

CANADA SOUTHERN.—Stockholders have authorized the \$40,000,000 consolidated mortgage bonds which stockholders of the Michigan Central, as previously announced in these columns, agreed to have guaranteed by the Michigan Central.

CAROLINA, CLINCHFIELD & OHIO.—A certificate of increase of stock has been filed in Virginia. There is now authorized \$15,000,000 preferred stock, of which \$10,000,000 is outstanding; and \$15,000,000 common stock, of which the entire amount is outstanding. The increase in stock is \$10,000,000 common, of which \$5,000,000 has been issued, bringing the total amount of outstanding common stock up to \$20,000,000.

CONNECTICUT RIVER RAILROAD.—Gov. Foss of Massachusetts has signed the bill authorizing this company to take over the Vermont Valley Railroad and the Sullivan County Railroad.

CUBA RAILROAD.—A dividend of 3 per cent. has been declared on the \$10,000,000 6 per cent. non-cumulative preferred stock, payable August first. This compares with 2½ per cent. declared in February, 1912, and 2½ per cent. declared a year ago at this time, and with 2 per cent. declared in February, 1911.

DENVER, LARAMIE & NORTHWESTERN.—On application of F. E. Bridge, a bondholder, and until recently a vice-president, a receiver has been appointed. The *Denver Republican* says that on February 16 the company owed to the Northwestern Land & Iron Company, \$1,207,496; to the Denver-Laramie Realty Company, \$200,000; to the Colorado-Wyoming Coal Company, \$75,000; besides being indebted for \$392,000 on pay rolls, etc.

DETROIT, TOLEDO & IRONTON.—The Central Trust Company, New York, has brought suit as trustee for the Detroit Southern and Ohio Southern, first mortgage 4 per cent. bonds to foreclose this mortgage.

EAGLES MERE RAILROAD.—The interests which bought this property in September, 1911, have organized under the name of the Eagles Mere Railroad Company, and have elected the following directors: H. L. Geyelin, William Emery, E. S. Chase, W. K. DeVictor, W. S. Kirk.

ILLINOIS CENTRAL.—Kuhn, Loeb & Company, New York, have bought from the company \$15,000,000 two-year 4½ per cent. secured notes, which the bankers have resold to the public. The notes are secured by \$14,000,000 Central of Georgia income bonds and \$5,000,000 Central of Georgia stock.

LARAMIE, HAHN'S PEAK & PACIFIC.—In the federal court at Cheyenne, Wyo., June 10, F. A. Miller, president of this road, was appointed receiver. Mr. Miller, who has resigned the presidency, says that the receivership had been applied for the purpose of straightening out some financial difficul-

ties, the nature or magnitude of which he did not explain; but he expects that the receivership will be of short duration and that the road will meet all obligations. The road is 110 miles long, extending southwesterly from Laramie, Wyo., to Coalmont, Colo., and it has six locomotives, two passenger cars and 41 freight cars. The funded debt is \$3,750,000, and the stock outstanding \$9,100,000. The secretary of the company is Arthur S. Howe, of Boston, and the American Trust Company, of Boston, is trustee under the first mortgage. The Guaranty Trust Company, of New York, is trustee under the refunding mortgage bonds.

MAINE CENTRAL.—The \$5,000,000 new stock recently authorized is being offered to stockholders at par.

MEXICO NORTHWESTERN.—The stockholders are offered the privilege of subscribing at 85 for £750,000 (\$3,750,000) 6 per cent. cumulative convertible income bonds. The company has 512 miles of line built and is now building 29 miles of what is known as the Chuichupa branch.

NEW ENGLAND INVESTMENT & SECURITY COMPANY.—Gov. Foss of Massachusetts has vetoed the bill to permit the incorporation of the Worcester, Springfield & Berkshire Street Railway, whose common stock was to be sold to the New York, New Haven & Hartford. The senate failed to give the necessary two-thirds vote to pass the bill over the veto, although the house had passed it by more than a two-thirds majority. In his message to the legislature Gov. Foss says:

"It is our right to demand proper additions and improvements, and it is time to put the seal of the disapproval of this commonwealth on the continuous proposals of the N. Y., N. H. & H. to do its duty by this commonwealth only in exchange for some desired piece of legislation.

"I also recommend that the state conduct through a special commission an investigation of the whole problem of more adequate railway facilities for the western section, particularly the hill towns of the state, and to report to the general court. If private capital is unable to supply this service without surrendering it to the domination of the New Haven road, I believe it is the duty of the state to supply that service directly by a state-owned system of electric roads."

NEW YORK, NEW HAVEN & HARTFORD.—Stockholders of the Bridgton & Saco River have voted to accept an offer to sell their stock at par. The purchasers are said to represent the New York, New Haven & Hartford. (See also the New England Investment & Security Company.)

NEW YORK, PHILADELPHIA & NORFOLK.—The Public Service Commission of Maryland has followed the advice of its counsel—already noted in these columns—and has refused to permit the issue of \$1,250,000 additional stock as a 50 per cent. dividend.

PERE MARQUETTE.—The Farmers' Loan & Trust Company, New York, has filed objections to the issuance of \$3,500,000 receivers' certificates recently approved by the Michigan railway commission.

PHILADELPHIA & BALTIMORE CENTRAL.—This company has asked the Public Service Commission of Maryland for authority to make a mortgage to secure \$10,000,000 bonds and to issue \$2,200,000 of these bonds at once.

ST. LOUIS SOUTHWESTERN RAILWAY.—A semi-annual dividend of 2½ per cent. has been declared on the outstanding \$19,893,650 5 per cent. non-cumulative preferred stock, payable June 15. In January, 1912, 2 per cent. was declared, and, in 1911 the annual rate was 4 per cent.

SEABOARD AIR LINE.—The 90,000 shares of preferred stock and 120,000 shares of common stock, bought from the Cumberland corporation by S. Davies Warfield and associates, was paid for at a price estimated to be about \$55 per share for the preferred and \$25 for the common. At the end of last week the common stock sold on the New York Stock Exchange at 24¾, and 54⅞ was bid for the preferred stock.

TEXAS & PACIFIC.—It is said that a new company, the Texas & Pacific Terminal Company, will be formed to finance the building of new freight and passenger terminals at New Orleans, to cost about \$5,000,000.

VERDE VALLEY RAILROAD.—This company has made a mortgage securing \$1,500,000 4 per cent. bonds of May 12, 1912-1962.